

CHOLERA,
 ITS NATURE, CAUSE, AND TREATMENT;
 WITH ORIGINAL VIEWS
 PHYSIOLOGICAL, PATHOLOGICAL, AND THERAPEUTICAL,
 IN RELATION TO FEVER;
 THE ACTION OF POISONS ON THE SYSTEM; &c. &c.
 TO WHICH IS ADDED,
 AN ESSAY
 ON
 VITAL TEMPERATURE AND NERVOUS ENERGY;
 EXPLANATORY MORE PARTICULARLY
 OF THE
 NATURE, SOURCE, AND DISTRIBUTION OF THE LATTER;
 AND OF THE
 CONNECTION BETWEEN THE MIND AND
 THE BODY: &c. &c.

BY CHARLES SEARLE,

SURGEON,

Of the Hon. East India Company's Madras Establishment.

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DEDICATION.

TO THE COURT OF DIRECTORS

OF THE

HONORABLE EAST INDIA COMPANY,

To whom Gentlemen, so appropriate, could I dedicate this work as to your Honorable Court, who have so repeatedly manifested an earnest desire—the subject of which it treats, having proved a scourge to so many under your dominion—should experience every consideration and attention.

In earnest of my zeal, therefore, in the profession of which I am a member; and best endeavours in a cause, which I repeat, has hitherto been deemed not undeserving your support;—allow me to dedicate this attempt, to improve our practice in the treatment of, as well as to extend our knowledge of its nature and causes: and to add, that I have the honor to be,


Gentlemen,

Your most obedient,

And faithful humble servant,

C. SEARLE.

LONDON, *May 1st*, 1830.



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PREFACE.

THE object of this work, is the improvement of our practice, in the attempt to define principles of treatment of a disease, the pathology and nature of which from being but imperfectly understood, many—very many, annually fall a sacrifice—at least such is my belief; not that I charge my professional brethren with any culpability in which I am not equally implicated; no, it was the experience of want of success in my own practice, with the loss of a relative, on the same occasion that the public sustained so heavy a one, in the death of the late revered Governor of Madras—Sir Thomas Munro, who also fell a victim to this disease:—leading me to the conclusion, that there was something radically wrong in our views and treatment,—induced me to investigate the numerous public records on the subject; from which I had deduced certain inferences, and was embodying my thoughts, in a shape suitable with the intention I meditated, of submitting my views to the Medical Society of Madras, then existing—when becoming myself the subject of its attack, it not only afforded me an opportunity of verifying the conclusions I had arrived at, with regard to the line of practice which should be pursued in the treatment; but under this personal experience, having strictly attended to the progression of the symptoms, and my feelings—it gave me a clue, which enabled me to solve, the

difficulties I before laboured under, with regard to the explanation of the symptoms and nature of the disease: in short, the explanation I arrived at, operating upon my mind, with all the force of the most perfect conviction—induced me to extend my original design, and to submit my views to the press at Madras, in an Essay, under the title of “Cholera Pathologically and Practically considered.” Two years having elapsed since this period, I have had both the advantage of further experience, and time and opportunity, for the maturity of my views, which I trust, are accordingly rendered more worthy of attention; which consideration, added to some others of no less moment—induces me, to make another attempt to draw the attention of the profession, to what I believe, a better pathology, and to defined principles of treatment; and not to relinquish a cause, which the following quotation from one of the Asiatic Journals of last year—must prove, is still deserving our most serious attention: this, indeed, becomes still more apparent, when we reflect upon the cause of the disease; which, if there be any truth in the one we have assigned for it, it is, but too obvious, must at certain seasons be in operation, as long as the same laws govern nature’s works: the proofs, too, being abundant, of the disease having been known in the East, from our earliest intercourse with the country.

“At a meeting of the Medical and Physical Society of Calcutta, held on the 7th of June, amongst the papers read and discussed at the meeting, was a history of the Cholera Morbus, as it appeared recently in H. M. 14th Regiment, at Berhampore, by Dr. Mouat.—Dr. M. witnessed the attacks of this scourge for upwards of ten years, and though he has studied it, watched its invasions, contemplated its progress, endeavoured to trace its causes, as well as to alleviate or mitigate its symptoms; yet he finds it the same inscrutable, inexplicable, and intractable disease, as when he first witnessed it in 1817.”—This avowal, made at a public meeting, in the spirit of candour, from a gentleman, whose

practice we can bear testimony to, as being in no ordinary degree judicious, but who, nevertheless, lost twenty out of ninety-four cases, requires no comment ; though it renders it but too obvious, that there is abundant room for better treatment, than is at present pursued : that, without any pretensions on my part to superior discernment, but having had the disease and recovered from it, which has not been the lot of many in the profession ; I may be allowed, to have attained a degree of experience, that others who have written before me on the subject, can lay no claim to ; and as I consider it an imperative duty upon every professional man, who has reason to suppose, that he can throw light upon a subject, which has no less to recommend it, than the preservation of the lives of those committed to our charge—to do so ; it would be morally wrong in me, with such an impression upon my mind, to withdraw from the attempt.

I may add, too, that I have been urged on to the undertaking, by a conviction, that the subject is not undeserving the attention of my professional brethren in this more favoured country ; having in view, the cases of the disease of recent occurrence—at Clapham : in reference to which, I took the liberty of calling upon the gentlemen, who were called in upon the occasion : who with the liberality of men having the cause of science and humanity at heart, and willing to obtain information, without reference to the source—encouraged me to persevere, flattering me with the belief, that the work would not be unacceptable to the profession at large.

To render it, therefore, more deserving of such attention, I have not confined myself to Cholera—simply ; the work embracing some original views, in relation to the operation of Malaria in the production of fever, to which, I am of opinion, I have made it clear, cholera is very nearly allied : as well as to other causes of fever ; and to the operation of poisons on the system : added to which, is an Essay on the Nature, Source, and Distribution of the Nervous Energy ;

an attempt to explain the connexion existing between the mind and the body ; and various phenomena both in health and disease, clouded at present in complete obscurity.

I have only to add, in appeal to the critic, that, as far as regards the composition and style of the work, I must solicit indulgence, feeling my incompetency in this respect ; craving also, a little indulgence towards my speculative views ; but not so, to the more important practical tendency of the work, for which, as it would be wrong to desire any—I ask none : that with a belief, the work is not altogether undeserving the attention of the profession ; and with the hope, that it may do some good, though conscious that it has many imperfections—I consign it to the press, and to the judgment of those—whose criticism I place every confidence in, being impartial.

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CHOLERA.

CHAPTER I.

GENERAL DESCRIPTION OF THE DISEASE, IN ITS
VARIOUS FORMS AND STAGES : WITH THE STATE OF
THE FUNCTIONS ; THE BLOOD. ETC. ETC.

Extracted from the Report of the Madras Medical Board.

“THE invasion of Cholera generally takes place in the night or towards morning. The patient is sick at stomach, he vomits its contents, and his bowels are at the same time evacuated. This evacuation is of a nature quite peculiar to the disease; the entire intestinal tube seems to be at once emptied of its fœcal or solid matters; and an indiscribable, but most subduing feeling of exhaustion, sinking, and emptiness is produced. Faintness supervenes, the skin becomes cold, and there is frequently giddiness, and ringing in the ears: the powers of locomotion are generally soon arrested; spasmodic contractions, or twitchings of the muscles of the fingers and toes are felt; and these affections gradually extend along the limbs, to the trunk of the body: they partake both of the clonic and tonic

spasm, but the clonic form chiefly prevails.—The pulse, from the first, is small, weak, and accelerated; and after a certain interval, but especially on the accession of spasms, or of severe vomiting, it sinks suddenly, so as to be speedily lost in all the external parts.—The skin, which from the commencement of the disease, is below the natural temperature, becomes colder and colder: it is very rarely dry; generally covered with a profuse cold sweat, or with a clammy moisture: in Europeans it often partially assumes a livid hue; the whole surface appears collapsed, the lips become blue, the nails present a similar tint, and the skin of the feet and hands become much corrugated, and exhibits a sodden appearance: in this state the skin is insensible even to the action of chemical agents; yet the patient generally complains of oppressive heat on the surface, and wishes to throw off the bed clothes; the eyes sink in their orbits, and are surrounded by a livid circle; the corneæ become flaccid, the conjunctiva frequently suffused with blood; the features of the face collapse; and the whole countenance assumes a cadaverous aspect, strikingly characteristic of the disease. There is almost always urgent thirst, and desire for cold drink, although the mouth be not usually parched. The tongue is moist, whitish, and cold.—A distressing sense of pain, and of burning heat at the epigastrium are common; little or no urine, bile, or saliva is secreted; the voice becomes feeble, hollow, and unnatural; the respiration is oppressed, generally slow; and the breath is deficient in heat.

During the progress of these symptoms, the alimentary canal is very variously affected. After the

first discharges by vomiting and purging, however severe these symptoms may be, the matter evacuated is always watery ; and in a great proportion of cases, it is colourless, inodorous, and often homogeneous. In some it is turbid, resembling muddy water ; in others it is of a yellowish or greenish hue. A very common appearance is that which has been emphatically called the “ congee stools,” an appearance produced by numerous mucous flakes, floating in the colourless watery, or serous part of the evacuation. The discharges from the stomach and those from the bowels do not appear to differ, except in the former being mixed with the ingesta. Neither the vomiting, nor the purging, are symptoms of long continuance : they are either obviated by art, or the body becomes unable to perform those violent actions ; and they, together with the spasms, generally disappear a considerable time before death. If blood be drawn, it is always dark, or almost black ; ropy and generally of slow, and difficult effusion. Towards the close of the attack, jaetation comes on, with evident internal anxiety, and distress : and death takes place, often in ten or twelve, generally within eighteen or twenty hours from the commencement of the attack.

During all this mortal struggle and commotion in the body, the mind remains clear, and its functions undisturbed, almost to the last moment of existence. The patient, though sunk and overwhelmed, listless, averse to speak, and impatient of disturbance, still retains the power of thinking, and of expressing his thoughts, as long as his organs are obedient to his will : such is the most

ordinary course of cholera asphyxia, when its tendency to death is not checked by art.

Cholera, like other diseases, has presented considerable variety in the symptoms: thus, when the disease appears epidemically, it may on one occasion be distinguished throughout by the absence of vomiting, and by the prevalence of purging; on another, by the excess of vomiting; and though more rarely, by the absence of purging. Spasm may be generally present in one instance of invasion; in another, it may not be distinguishable.—A frequent variety, the worst of all, is, that which is noted for the very slight commotion in the system; in which there is no vomiting; hardly any purging, perhaps one or two loose stools; no perceptible spasm, no pain of any kind; a mortal coldness, with arrest of the circulation comes on from the beginning, and the patient dies without a struggle.

Vomiting is sometimes altogether absent, or if it has been present, soon ceases from an atonic state of the stomach; under which that organ receives and retains, whatever may be poured into it, as if it were really a dead substance.

Purging, is a more constant symptom of cholera, than vomiting; and, in a large majority of cases, it is the first in order of occurrence; but being a less striking deviation from a state of health than vomiting, which instantly arrests the attention, it has usually been treated of in succession to it: this symptom has very rarely been altogether absent: its absence appears indeed to denote, a peculiar degree of malignancy in the attack. There is seldom much griping or tenesmus, although the

calls are very sudden and irresistible. They also sometimes take place simultaneously, with vomiting, spasm, and stoppage of the pulse ; as if all these affections originated at the instant from one common cause.—In advanced stages of the disease purging generally ceases, but in many cases a flow of watery fluid from the rectum takes place, on any change of position. The matters evacuated after the first emptying of the bowels, have been occasionally observed to be greenish or yellowish, turbid, of a frothy appearance like yeast, and sometimes bloody ; but by far the most common appearance is, that of pure serum, so thin and colourless, as not to leave a stain on the patient's linen. The next in order of frequency is the conjee-like fluid ; the mucus is at times so thoroughly mixed however with serum, as to give the whole the appearance of milk or chyle : the evacuations have also been noticed, to resemble soojee in colour and consistence, and these cases were mild. The quantity of the clear watery fluid, which is sometimes discharged, is exceedingly great ; and were it uniform, it might afford us an easy solution of the debility, thirst, thickness of blood, and other symptoms : but it is unquestionable, that the most fatal and rapid cases, are by no means those which are distinguished by excessive discharges. We have innumerable instances on the contrary, of death ensuing after one or two watery stools, without the development of any other symptom affecting the natural functions. Even collapse has come on, before any evacuation by stool had taken place.

Of the animal functions, the undisturbed state of the mind, has been the subject of general remark :

but it cannot be matter of surprise should some exceptions occur, from a fortuitous morbid affection of the brain, following a state of sanguineous congestion: instances are not wanting, of patients being able to walk, and to perform many of their usual avocations, even after the circulation has been so much arrested, that the pulse has not been discernible at the wrist: the cases here alluded to, are those chiefly, in which it has begun by an insidious watery purging: and many lives have been lost in consequence of the patients, under these fallacious appearances, not taking timely alarm, and applying for medical aid. In other cases again, the animal functions appear to have been early impaired, and the prostration of strength to have preceded most of the symptoms. The voice in general, partakes of the debility prevailing in the other functions; and is usually noticed as being feeble, often almost inaudible. Deafness has also been remarked, in some instances, to have been completely established. Spasm has been held, to be so essential a feature, of that species of cholera of which we are treating, as to confer on it a specific name: in so far, however, as relates to the muscles of voluntary motion, and it is that description of spasm only, which we mean here to treat, no symptom is more frequently wanting: spasms of the muscles chiefly accompany those cases, in which there is a sensible, and violent commotion in the system; hence they are more frequently found in European, than in native patients, and in the robust of either, than in the weakly. In the low, and most dangerous form of cholera, whether in European or native cases, spasm is generally wanting, or is present in a very

slight degree. The muscles most commonly affected, are those of the toes and feet, and calves of the legs ; next to them, the corresponding muscles of the superior extremities ; then those of the thighs and arms ; and lastly those of the trunk ; producing various distressing sensations to the patient.

Of all the symptoms of cholera, none is so invariably present, none indeed so truly essential, and diagnostic, as the immediate sinking of the circulation. It must nevertheless be admitted, that, where instant remedial measures have been successfully practised, this symptom may not have developed itself ; and that there are even cases, where, an excited vascular action has been observed, to accompany the first movement of the system in cholera. Some intelligent practitioners have entertained doubts, whether such cases belong indeed to this disease : it is, however, to be remembered, that these are precisely the cases which yield most certainly, and readily to our remedial means ; and it consequently follows, that a medical man can seldom have the opportunity of observing, whether or not, this form of cholera will degenerate into the last stage. There is, however, direct evidence in support of the fact, that they have so degenerated, and gone on to a fatal termination.—In the case of soldiers, too, in whom such symptoms have chiefly appeared, we must make some account, of the quantity of spirits usually drank by them at the commencement of the disease, producing an effect on the circulation. The period, at which a marked diminution of vascular action takes place, is somewhat various ; the pulse, sometimes keeps up tolerably for several hours, though very rarely : it more

generally becomes small, and accelerated at an early stage, and on the accession of spasm or vomiting, suddenly ceases to be distinguishable in the extremities. The length of time, during which a patient will sometimes live, in a pulseless state is extraordinary.

Thirst, and sense of heat, or burning in the region of the stomach, are generally connected together, and form very prominent and constant symptoms of cholera; yet not only individuals, but even in epidemic invasions, these symptoms have often been altogether wanting. Even when they are present in the highest degree, the mouth is not often parched, nor the tongue often dry; on the contrary, there seems in general no want of moisture; and while, as Mr. Jameson observes, "all is burning within," these surfaces are cold and blanched—at times, however, the mouth is parched, and the tongue dry and furred. But practitioners seem doubtful, whether any practical inference is thence to be drawn: what would be the state of these parts, if calomel, ardent spirits, laudanum, and spices were as largely employed in health, or in many common diseases, as in cholera, with as scanty a use of diluents?—When thirst is present, it seems to subdue all other feelings; and the ignorant soldier, as well as the medical man, who firmly believes, that cold water is almost certain death, alike eagerly seek and swallow it.—The state of the skin is cold, generally clammy, and often covered with profuse cold sweat: nevertheless, varieties occur in this, as in the other symptoms of cholera: the skin is sometimes observed to be dry, though cold; and sometimes of natural, nay, in some rare instances,

of preternatural warmth. An increase of temperature has been repeatedly observed to take place just before death; but the development of heat appears to be confined then to the trunk and head; and in almost all cases, this partial development of heat, is found to be a fatal symptom: it is entirely unconnected with any restoration of the energy of the arterial system, or any improvement in the function of respiration.—At a very early stage in cholera, leeches can procure little or no blood from the skin. This fact is noticed by some, in another sense, as if these animals turned in abhorrence from the skin of a person ill with cholera.—When the sweat is thin, it is usually poured out in large quantity, from the whole surface of the body; but when thick, or clammy, it is more partial, and generally confined to the trunk and head. The action of the vapour and hot baths, seem unquestionably to increase the exudation, or secretion from the skin; and the application of dry heat, as the natural temperature of the skin augments, appears to restrain these discharges.

That remarkable shrinking of the features of the face, which has acquired the emphatic term, of the “true cholera countenance,” appears in every case, not quickly cut short by medicine.—This expression of countenance, which conveys too truly that of death itself, cannot be mistaken, and by an attentive observation it will be perceived, that a similar shrinking takes place throughout the limbs, and all the projecting parts of the body.

Respiration is not usually interrupted in the early stages of cholera. In many cases terminating in death, respiration has gone on in its mechanical

part, with little or no interruption, except, that it becomes slower and slower. Numerous cases on the other hand are noticed, especially in Europeans, where the interruption of respiration was most distressing, and could only be compared to the most violent attacks of asthma.—Although the breath is stated, in many of the reports, to have been deficient in heat, it is not clear that this is a general symptom, nor is it understood, that this coldness is more particularly observed, in cases of difficult and laborious respiration, than in those, where this function, seemed to be at least, mechanically performed without interruption.

In a disease, so highly congestive as cholera, where vertigo, deafness, and ringing in the ears often prevail; and where very large quantities of opium, and intoxicating matters have been swallowed; it is truly surprising, that the functions of the sensorium are so very rarely disturbed. It seems probable, that it is in many instances, from an inaccuracy of language, that coma, has been represented as a symptom of cholera.* Coma, must however be admitted occasionally to occur, especially towards the termination of the case, when it is fatal: but delirium has seldom, or never been observed; unless, as a sequela of cholera.

When medical aid is early administered, and when the constitution is otherwise healthy, the recovery from an attack of cholera, is so wonderfully rapid, as perhaps to be decisive, of the disease being essentially unconnected, with any organic lesion.—

* This assuredly is a mistake, a listless comatose state, being a very common symptom in my experience, and of general remark.—*Author.*

In natives of this country especially, in whom there is ordinarily very little tendency to inflammatory action, the recovery from cholera is generally so speedy and perfect, that it can only be compared to recovery from syncope, cholie, and diseases of a similar nature : but in Europeans, in whom there is a much greater tendency to inflammation, and to determinations of blood to some of the viscera, the recovery from cholera, is by no means so sudden, or so perfect ; on the contrary, it is too often involved with affections as various, as the diseases of these viscera, are known to be in this climate.—The most frequent of the sequelæ of cholera, are affections of the intestines, of the brain, of the liver, and of the stomach.—When cholera, however, is of long continuance, and when the congestions appear to have been thoroughly established, few, either Europeans or natives, who outlive the attack, are restored to health, without considerable difficulty.—It has been already remarked, that recovery from an attack of cholera, is indicated, by the return of heat to the surface of the body, and rising of the pulse ; a deceitful calm, however, sometimes attends these favorable appearances, which too often mocks our hopes and expectations. And, on the contrary, patients have been observed to remain for one, two, and even three days, in a state of the greatest collapse, and yet, contrary to all expectation, have recovered.

No symptoms of cholera are so uniform in their appearance and progress, as those connected with the blood, and its circulation—it is established by undoubted evidence, that the blood of persons attacked with cholera, is of an unnaturally dark

colour, and thick consistence—these changes in the condition of the blood, are likewise fully proved to be in the ratio with the duration of the disease.

A great majority of the reports state unequivocally, that after a certain quantity, of dark and thick blood has been abstracted, from a patient under cholera, it is usual for its colour to become lighter, its consistence to become less thick, and for the circulation to revive; such appearances always affording ground, for proportionably favorable prognosis.—In many instances, however, no such changes have been observed to accompany the operation of bleeding, while yet the result was favorable. The blood is generally found to be less changed in appearance, in those cases of cholera which have been ushered in with symptoms of excitement, than where, the collapsed state of the system has occurred at an early period. The blood has been occasionally found on dissection, to be of as dark colour in the left, as in the right side of the heart; affording reason to believe that in the whole arterial system, it was equally changed: the temporal artery having been frequently opened, the blood was found to be dark and thick, like the venous blood.

Amongst natives, respiration is pretty generally free, until the very last stage; and the colour and consistence of the blood, in the instances where venesection has been performed, has been very uniformly stated to be dark, whether excessive discharges prevailed or not: it may thence be allowable to conclude, without any further particular evidence, that though the passage of the blood

through the lungs has been free, its natural change is interrupted by cholera.

It is the declared opinion of many practitioners who have had to cope with the disease, that its tendency to death is so great, as never to be counteracted by the unaided efforts of nature.—The same opinion is no less implied, by the observations of all, that the delay but of a few hours, places the patient beyond the reach of art ; for hours are in this disease, as days are in others : that death may be said to be the ordinary termination of cholera ; and there is, in truth, very little variety in the course, which the disease pursues towards it : this has already been described as consisting, in a general suspension of the natural, and gradual cessation of the vital functions ; rather than in the establishment of morbid actions. Cases have been remarked, where the vital functions have been more suddenly overcome, and where death took place, before the usual development of the symptoms.—Fatal terminations likewise occur, from topical inflammations supervening, as gastritis, enteritis, or hepatitis : the intestinal canal, seems especially obnoxious to the effects of cholera ; numbers of those attacked with it, having subsequently been seized with dysentery.”

The above is a most excellent general description of the disease and its symptoms ; but the following Extracts from Mr. Orton's work, I beg to be permitted to add, as being more precise with respect to their progression ; an accurate detail of which, being of equal import to the elucidation of its phenomena. In addition to which consideration, there

are a number of such excellent observations, and quotations interspersed; the former of which we may suppose to have emanated from his experience, knowing, he had but too frequent opportunities of witnessing the disease, that render them in my opinion, of a highly valuable character; and will leave nothing further to be desired, in this account of cholera, under the head of description; although it will subject me, I fear, to the charge of unnecessary prolixity, as I must plead guilty, to a few repetitions.

“ The attack of cholera is usually sudden and violent, but in a great majority of instances, not without some premonitory symptoms—it is frequently preceded by a simple diarrhœa, continuing several days, and still more commonly by other slight affections which are more characteristic of the disease; an extraordinary depression of spirits, and general uneasiness come on, attended by tremor, and sense of debility; giddiness and head-ache, and occasionally ringing in the ears, are also felt, particularly on rising from the recumbent posture, or making any sudden movement. Pains, resembling those which attend the accession of fever, are frequently felt in the limbs; the bowels are griped occasionally, and natural loose stools occur; and nausea comes on. The circulation, and temperature of the body are variously disturbed, but most commonly, the pulse is accelerated and weakened; the skin is moist, and colder than usual, to the hand of another.—These symptoms, or some of them, not unfrequently continue many hours, or even a day or two, without proceeding much farther, or exciting much attention.

In general, however, the severer affections quickly set in, or as he at the commencement observes, the attack is sudden and violent. Acute griping is felt; the stools become frequent and watery, and soon change to the congee-water appearance; vomiting comes on, of the same mucous fluid appearance; copious sweat breaks out, and anxiety and debility rapidly increase; and the countenance assumes, a peculiar shrunk ghastly appearance. It is usually during a fit of vomiting, that spasms of the muscles are first felt, they are almost invariably of the tonic kind, recurring in paroxysms, of the duration of a minute or two, and at intervals of a few minutes; and attended with excruciating pain: they affect occasionally and in turns, the whole of the muscles of voluntary motion, but particularly those of the legs and feet: the abdominal muscles, and those of the chest are frequently affected, but not particularly so: great debility of the circulating system, very constantly attends the accession of spasms, or severe vomiting: I have frequently found, the pulse sink at once, on the first appearance of spasm in the muscles, from the natural state so as scarcely to be felt, or even disappear entirely from the wrist in an instant: and in such subjects as are not affected with spasms, this fatal failure of the circulation not unfrequently appears, with the first paroxysm of vomiting. The frequency of the pulse is very variable, in many instances it is rapid from the commencement, in others its frequency is little changed in the early stage; but in all, it becomes extremely quick as the disease advances.—The respiration from the first severe accession, is observed to be hurried and oppressed, and is fre-

quently complained of. As the disease increases in violence, the colour of the whole surface changes to a livid hue, particularly round the eyes and at the extremities. The surface is bathed in cold sweat; the hands and feet, and afterwards the whole body, rapidly grow cold.

A small number only of the symptoms of this disease, have yet been described, and it is necessary to return to the early stage, when the spasms, and other severe affections first set in; from this period, an extreme thirst invariably attends; and notwithstanding the coldness of the body, there is an ardent longing for great quantities of cold water; an acute pain is felt in the situation of the stomach, which has been generally and distinctly observed to be increased on pressure, and sometimes on inspiration. A sense of heat is likewise felt in the same situation, and frequently extending over the whole abdomen; which has been compared to the effects of burning embers, or a blister in the stomach. Great oppression, and sense of anxiety are also preferred to the præcordia; the secretion of urine, and of bile under the existence of the severer symptoms, is completely suppressed: the tongue is natural at first, but in the course of the disease, it becomes furred, and deficient of moisture; and dryness of the mouth and throat, is very generally complained of: the hands are sodden with cold sweats, shrivelled and shrunk, like those of a washerwoman after a day's labour, and frequently of a very dark blue colour: although the temperature of the body is greatly diminished, the patient is not sensible of it, on the contrary, he frequently complains of heat, and is incessantly throwing off

the bed clothes; these movements are, however, more occasioned by an extreme restlessness and anxiety, which prevent his remaining an instant in the same position: it appears to be attended with such an extreme degree of suffering, as human nature cannot long support; and accordingly, we seldom find it of long duration: it is gradually relieved, or removed by stupor, and though these symptoms are of so opposite a nature, they are frequently present, in a very considerable degree at the same time; the patient feeling a constant inclination to doze, and waking every instant, tossing and groaning in a dreadful state of anxiety.

On the accession of the spasms, or, in those subjects in whom they do not appear, of the vomiting, the other symptoms above described, usually either make their appearance, or undergo a marked exacerbation. The disease at that period, seems to put on its most acute form, and the great struggle takes place.—It is quickly decided—after an uncertain continuance of this state, to which I cannot with truth, apply a term of greater precision, than a few hours, a remarkable change takes place, which might lead a practitioner unacquainted with the disease, to congratulate himself on having arrested the worst symptoms, and to form a favourable prognosis, even when death is approaching with rapid strides: the spasms, the vomiting, and the purging cease, usually about the same time. Whatever is taken into the stomach is retained, even though in large quantity; and elysters, not rejected as formerly. About this time likewise, the state of dozing and stupor which is described as above, appears, and considerably resembles natural

sleep. But any favourable inference which may be drawn from these appearances, is quickly contradicted, by the continued weakness of the circulation, the coldness and livid colour of the surface, and the cadaverous expression of the countenance.

The powers of life continue rapidly to fail—the pulse becomes quite lost at the wrist, and even at the humerus; the pulsation of the heart itself is felt extremely feeble; the eye is sunk back and fixed in its socket, the cornea becomes dull and glassy, or is covered with a tenacious film. From the shrinking and wasting of the features, the eyelids are rendered incapable of performing their office, and in the attempts to sleep, the eye is half open: deafness, preceded or accompanied by tinnitus aurium, is very common in this stage: false vision, blindness, and dilated pupil, are equally so; speech becomes difficult, and the voice grows hoarse, hollow, and scarcely intelligible, or entirely lost. The breath has been observed to be cold, “as if it came out of a lump of clay.” The internal senses are occasionally observed to survive the other faculties; but more frequently they are absorbed by stupor. Respiration is short and laborious, and frequently stertor supervenes—after a further continuance of some hours, with various degrees of the preceding symptoms, death closes the scene; usually with little suffering.

If the termination is different, a favourable crisis occurs, which is almost invariably marked by sleep of unusual soundness; attended by warm perspiration, and light and natural respiration—the favourable change takes place, at all periods of the disease; but most frequently, before that morbid

quiescence with its attendant symptoms, which have been noticed ; for this state, is very commonly followed by death : on waking, the patient feels himself thoroughly relieved, and expresses his satisfaction in the strongest terms—at the same time an evacuation of bilious fœces, and urine generally takes place ; and from this period, a considerable purging of black, green, or yellowish feculent matter arises. At this time also, other signs of increased action manifest themselves : the pulse rises above the natural standard, both in frequency and volume ; the skin grows rather hot, though moist, and frequently there is a copious perspiration.

The Bengal Medical Board have given a luminous description of this stage of excitement or reaction, which in a greater or less degree, appears always to follow the favourable crisis : they have observed it rising to a great height, assuming all the characters of the idiopathic bilious fevers of the country, and occasionally becoming fatal. This, however, does not appear to have been commonly the case on the other establishments—a slight and salutary degree of reaction only, has usually followed, which has quickly subsided ; a rapid convalescence has generally ensued, and the strength and looks have been regained, almost as quickly as they were lost.

A still more rapid and violent description of the disease has frequently been observed, particularly in natives :—in a state of health when the patient is going about his usual occupations, the sensorium is in an instant invaded, by violent vertigo and ringing in the ears, together with deafness, and dimness of sight. The contents of the bowels are

discharged, much diluted, at one very large evacuation; after which, the white stools characteristic of the disease immediately appear, vomiting and the other violent symptoms at the same time set in, and most extreme debility, and even death is produced in the course of half an hour. The first appearance of the disease in His Majesty's 34th Regiment, was marked by a single case, which was fatal. On the two following days no attack was observed; and the alarm which was excited, had begun to subside: but on the day succeeding, thirty-seven men were carried in general nearly lifeless to hospital, between morning and midnight; in that short space, fifteen of them died. It would appear, that when the spasms are very violent and general, and the retching extremely distressing, that purging is little remarkable, and frequently altogether absent.

Another very striking set of features of this proteiform disease still remains to be delineated; and although I have deferred, for the sake of perspicuity, the mention of them until now, they are amongst the most important, and most constant in occurrence.—The burning pain in the stomach, increased on pressure, and the common circumstance of the ingesta being instantly rejected, are indicative of inflammation of that organ; and the appearances on dissection fully prove, that this affection takes place, perhaps in every instance; for, whenever the disease has been of sufficiently long duration, to allow time for appearances of inflammation to be formed, they are invariably found, not only in the stomach, but in the intestines. In many instances, we have the most convincing

proofs during life, of the existence of inflammatory action, in different parts of the frame: if the extreme depression of all the powers of life already described, and particularly if the state of torpor, which follows the morbid cessation of vomiting, purging, and spasm, is not quickly concluded by death, or natural sleep, the temperature from being far below the natural standard, rises above it. If there is any vigour of the circulation left, the heat extends over the whole surface, and the moisture disappears; but if the powers of life are unequal to this, the trunk only becomes hot, the extremities continuing quite cold, and moist. Under these circumstances, the pulse is also extremely quick, 140 and upwards, sharp, and occasionally possessing a peculiar irritated thrill, which is strongly expressive of inflammation of vital parts. The tongue grows furred and dry, and in combination with these symptoms, many local appearances occur, leading to the same conclusion.—In some cases the vomiting returns, and continues very frequent, the stomach rejecting every thing which is taken in, for several days: in others, there is fixed pain, and soreness all over the abdomen; and if the inflammation attacks chiefly the brain, there is occasionally muttering delirium, but more frequently, coma, with deep and stertorous breathing, and suffusion of the conjunctiva, which quickly terminate in death. In cases which have lingered on for some time, in any of these states, and even when the topical symptoms are scarcely at all evident, the appearances of inflammation on dissection are strongly marked, and quite sufficient to account for death.

This inflammatory stage frequently lasts several, even many days. If the depression of the *vis vitæ* is extreme, the secretions of bile and urine, and perhaps nearly all the secretions, continue suppressed throughout. Under other circumstances, I have observed, small quantities of high coloured urine frequently passed; and black or green stools occur, without a favourable termination. On the commencement of this stage, the pulse usually becomes rather more distinct; but it is more from increased sharpness, than fullness; and we are presented with the remarkable phenomena, of acute inflammation, and extreme debility prevailing at the same time, and indicating opposite modes of treatment.

It is not only during the existence of the worst symptoms of cholera, that this extreme tendency to inflammation appears, but it may be perceived in a less degree, after the favourable crisis, and during convalescence. Under these circumstances I have observed, a great number of diseases of this nature, making their attack; Mr. O. particularly mentions enteritis, hepatitis, and dysentery; and occasionally phrenitis.

The description of the more common, and fundamental type of the epidemic is now completed.—It will be perceived, that the disease presents an extreme variety, and perhaps unparalleled number of symptoms; and that the severer form of the disease, such as has already been described, is chiefly characterized by diminished action, and suppression of function;—the most striking variations from these common appearances, have been observed, in a set of cases which are chiefly marked

by the preponderance of increased action.—Dr. Burrell, in a report to the Medical Board of Bombay, after describing the low form of the disease, says: “ On the 22nd inst. when the men had been duly warned of danger from not reporting themselves sooner, I got into hospital a different description of cases, viz. men with a full pulse, hot skin, constant vomiting of white matter like thick congee; seldom any purging, if it existed, it was like the matter vomited.—Bleeding was used in every case, with so much success, that I have no hesitation in recommending its adoption.—The first symptoms in the attack, were, languor with occasional pains, and sense of numbness in the extremities; violent head-ache, and thirst; shortly there ensued, nausea, vomiting of slimy matter, weight over the præcordia, with griping in the bowels, small stools of white slimy matter, no appearance of bile from the stomach or bowels. The spasms followed in many cases so violent, as to require six men to hold the patient.—If relief were not immediately given, it is astonishing how soon the system sunk under the attack, marked by the ends of the fingers and toes getting cold, pulse and motion of the heart ceasing, with a livid mark round the eyes.”—Mr. Whyte observes, “ the disease continues to present a milder aspect, and now occurs but rarely; loss of pulse and coldness are seldom observed, and often it first shews itself, by a severe pain in the abdomen, attended with cramps of the lower extremities, sometimes by a sudden giddiness, and confusion, loss of memory, and vomiting; attended also with cramps: indeed, but for these cramps, I think it would be impossible to

distinguish this stage, from fever at the beginning ; and these are hardly attended with any danger."

My own experience has also been very conclusive with regard to the sthenic form of the disease.—I have found a very considerable number of cases, exhibiting, singly or in partial combination, every possible degree, and almost every kind of increased action.—Spasms, such as not to fall short of the highest degree of tetanus ; retching, and spasms of the intestines equalling colica pictonum ; very full, hard, and quick pulse ; hot skin and flushed surface ;—evacuations of bile, both by vomiting and stool, from the commencement of the attack.—And finally, I have seen some of these cases passing into the low form of the disease ; the circulation passing suddenly, from extreme strength to extreme weakness ; the skin from being hot and dry, becoming deadly cold, and bathed in sweat ; and the increased flow of bile, succeeded by white stools, and vomiting, clearly indicating the total suppression of that secretion.—The inference from these facts is plain ; however opposite these two forms of the disease may appear, there is no essential or generic difference between them.

Some difference in cause must however exist, to produce this difference of effect ; and there is one general observation, which holds good with regard to all the increased actions—with the exception of inflammation, that sufficiently points out what this difference is : they are found to indicate, a smaller degree of the disease, than that, which gives rise to the opposite affection.

The extracts which have been made, to prove the existence of affections of this kind, also prove,

that they are symptoms of a less dangerous form of the disease. Mr. Whyte distinctly observes, that the cases which he describes, were of "a milder type." He was uniformly successful in their treatment; and Dr. Burrell saved nearly the whole of his cases of the kind, yet the plan of treatment which these gentlemen employed, were extremely different from each other. On the decline of the epidemic in the 34th Regiment, Mr. Allardyce observed, many cases attended with bilious discharges throughout, and he constantly found them mild and tractable.

Mr. M'Cabe informs me, that he has found the cases, which to common observation might appear the most desperate,—those which were attended with spasms, and retching of extreme violence,—actually amongst the most tractable.—A truly valuable remark, which my own experience fully confirms. Dr. Burrell saved 88 out of 90 of his latter cases, and in his general description of them, he says, that the retching was constant, and the spasms so violent, as to require six men to hold the patient on his cot. On the other hand, nothing can be more evident, than the intractable, and fatal nature of those cases, in which, the pulse instead of rising, sinks at once; in which, there are no spasms, and scarcely any vomiting, or purging; and in which, not only the secretion of bile, but all the secretions, appear, to be entirely suspended.

As it has been said, that the preponderance of increased action marks a milder form of the disease, and that the European constitution more frequently exhibits that phenomenon, than that of the native, it follows, that the disease should be less fatal in

the former, than in the latter class of persons, which experience proves to be the case.

In fact it would appear, that increased action in general, whether, arising from a smaller degree of morbid cause, or greater vigour in the system, is equally indicative of less disease. It is evident, that the quantum of disease in any case, must be, not only in proportion to the quantity of external cause, but in the inverse proportion to the power of resistance against it, inherent in the frame. The most vigorous and healthy, are incontestably the least subject to this epidemic, or when attacked, to its more dangerous forms; and it is probable on the foregoing principles, that these previous states of the system, by affording resistance to the morbid influence, reduce the disease to its milder form, and thus chiefly give rise to the same phenomena, as those which attend the diminution of the great cause of the epidemic.

It appears, therefore, that the great and ordinary diversities in the phenomena of cholera, which arise from, unusually increased or diminished action, are principally referrible to different degrees of disease."

CHAPTER II.

APPEARANCES ON DISSECTION.

These I have also extracted from Mr. Orton's work, being substantiated by quotations from the best authorities; in accordance with general experience; and my own enquiries in this way.

THE morbid appearances which I have observed on dissection, in a great number of instances in this disease, have been pretty uniformly as follows:—

A dark blue, or livid colour of the surface of the body, existing in various degrees, in different parts of different subjects, but most remarkable at the extremities. It appeared to prevail most, in the more robust and sanguineous subjects, and in the more rapid cases. Blood, taken from both the venous and arterial systems, was found to be of a very unusually dark, and purplish colour.

The internal organs in general, were found much gorged with blood—this, was particularly remarked in the veins of the mesentery and stomach, and in the lungs.

Many extensive patches of a crimson colour, on the stomach, usually confined in a great measure, to its inner coats; similar appearances in the intestines, most remarkable in their inner surface, but appearing externally in a greater degree than in the stomach—they were much more evident in the small, than in the large intestines.

The stomach, containing the ingesta which had been given, for some hours before death in considerable quantity, and little altered, either in appearance or smell: calomel was frequently found at the bottom of the fluid contents, and adhering in various places to the mucous coat. The intestines were in a great measure empty; their contents, were usually free from the slightest tinge of bile, and consisted chiefly, of a dirty whitish mucus, resembling congee or thick barley water, slightly turbid with milk: large portions of them, were frequently found contracted, so as with difficulty to admit the finger into their cavities, particularly of the large intestines.

The gall bladder contained the natural quantity of bile, of no very remarkable appearance. The gall ducts were found pervious; the bile flowing readily into the duodenum on pressure being made on the gall bladder.

The urinary bladder, was almost invariably found contracted, to the size of a hen's egg; without containing a drop of urine.

The veins of the brain, were much distended with black blood: the minute arteries of the dura mater, and membranes of the brain, were frequently found injected. I am informed, that actual extravasation of blood, in considerable quantities, has in some instances, been found on the surface of the brain.

Mr. Annesley, surgeon of the general hospital at Madras, has examined the appearances on dissection in a great number of cases. In the case of a native, who was recovering from amputation, and died after a few hours illness, the following are the principal morbid changes, which he noticed on dissection.

The small intestines, in many places of pulpy appearance and darkish pink or flesh colour, inflated with air, and bearing evident marks of great congestion—similar appearances of suffusion and congestion in the stomach—the colon contracted, without congestion or change of colour.

The lungs, were found collapsed and condensed, of a black colour on both sides, resembling a mass of bruised flesh, and when cut into, bled profusely; the heart containing black blood throughout.

The meningeal arteries and veins exceedingly turgid, both in their trunks and branches: in the anterior portion of both the hemispheres of the cerebrum, there was the appearance of considerable arterial action, the arterial branches spread over that portion of the brain being highly injected with red blood. The large veins in the same situation were likewise highly injected with black blood; and, upon the middle lobe of each hemisphere, there was a kind of gelatinous extravasation, as if some severe injury had been inflicted. Six ounces of watery fluid was found between the membranes: some effusion was also found in the cerebellic cavity, and in the top of the spine; and a very great turgescence of the vessels surrounding the whole of the cerebellum.

Another case, which was fatal in 18 hours from the attack, exhibited appearances in general similar to the former; but the whole of the internal coat of the stomach was of a dark bloody appearance, as if blood had been extravasated in considerable quantities between the coats. The brain and lungs as in the former case. In many succeeding dissections the appearances were found so similar, that

Mr. A. has deemed it unnecessary to particularize them. The above observations being in general referred to, as expressive of the whole. The serous effusion on the brain, does not however, appear to have been generally observed, in so great a degree as in the first case.

In a circular letter, written by the Medical Board at Madras, on the first appearance of the epidemic on the establishment, giving a full and distinct account of the disease, with directions for its treatment; the morbid appearances on dissection recorded, are, inflammation and determination of blood to the stomach, intestines, and other abdominal viscera, and even to the brain itself; contracted state of the urinary bladder. In one case it is remarked, that the stomach and intestines were inflamed, and their texture so much destroyed, as to occasion their being lacerated by the slightest touch: the duodenum remarkably hard and contracted.

The Medical Board of Bengal, have observed appearances very similar to those already described:—excessive congestion of the internal veins: inflammation, and effusion of coagulable lymph.

Dr. Burrell found the liver of a dark colour, distended with blood, and the gall bladder full of bile. The spleen of an extremely blue colour. The omentum inflamed, and its veins filled in every part. The small arteries of the intestines, of a lively red; the colon, contracted throughout its length to the size of the middle finger, and its calibre so small, as hardly to allow a scalped handle to be introduced.

“The veins of the stomach more particularly ar-

rested our attention ; on the great curvature they were of an intermediate size, between a crow's and a common quill, these turgid veins were more apparent internally ; and the most forcible injection, could not have more completely filled these vessels : the mesenteric vessels, as well as the vessels of every other internal membrane, partook of this appearance, of formerly increased action. The lungs were dark, and suffused with blood. This most probably is the cause, of the stertorous and laboured breathing, present in almost every fatal case."

Mr. Whyte, in a case of 19 hours duration observed, the liver increased in size, and full of blood. The vesica fellis pretty full ; the stomach very much so, and of so dark a colour, that on a superficial examination, it might be thought in a state of gangrene. The small intestines too presented a similar appearance, and might easily give rise to a similar mistake, but both were perfectly adhesive and firm. The colon contracted to the thickness of a finger, and pale, he considers the dark appearance of the stomach, and intestines as arising from fullness of their small veins ; and describes the extreme turgescence, of the large veins noticed by Dr. Burrell. The lungs were found of a much darker colour than natural, approaching to that of the liver, the bladder empty.

In another case of 38 hours duration, which was comatose for 24 hours before death, the same dark colour of the stomach was found, but without distention of the larger veins.

" A portion of the ilium, to the extent of about 18 inches from the caput cœci, with its corres-

ponding mesentery, was perfectly black, and gangrenous in appearance:—the colon throughout was much more diseased, than either the stomach or upper portion of the small intestines; although not so much so, as the portion of the ilium just taken notice of—it appeared in a state intermediate, between venous congestion, and arterial inflammation; indeed its colour and whole appearance, as well as that of the mesocolon was of that mixed nature, that I do not know a better method or mode of expression whereby to convey an idea of it: and here I may remark, that in this disease, I think the former state, runs frequently into the latter.”

“ On examining the upper part of the cranium we thought the dura mater inflamed, the trunks of large blood vessels were distinctly seen through it; and on removing this membrane we were presented with a beautiful sight: the veins of the pia mater distended as if ready to burst, and running in all directions among the convolutions of the upper hemisphere. The increase of size was perfectly sufficient, to account for the coma which had taken place; several small arteries were seen, but I think not more than are usually found, and certainly not enough for us to infer, that the membrane had been inflamed:—no serum was found in the ventricles.”

Mr. Craw in a case of 18 hours duration, found on dissection, “ the vessels of the stomach, duodenum, and the whole of the alimentary canal, with those of the mesentery, liver, and lungs, amazingly gorged and distended with blood:—many of the veins, particularly of the stomach and mesentery, were as large as crows’ quills; and the smaller ramifications of the arteries, were also distended,

with every appearance of general inflammation, as well as venous congestion. The arch of the colon much contracted."

In another case, " symptoms of coma, and great derangement of the head, with great anxiety, and oppressed and laborious breathing speedily came on; and the hands, arms, and lower extremities were cold, whilst the rest of the body retained its natural temperature. Powerful stimuli were administered, and blisters applied to the epigastrium, head and back of the neck; and leeches to the forehead; but these were not successful in drawing blood, and the man sunk. On dissection, we found the same congestion of blood in the abdominal and thoracic viscera, as in the former case; but there were also, large spots of extravasated blood found in different parts of the intestinal canal; and in other places, decided appearances, of increased arterial action; while a large portion of the ilium and colon was in a completely gangrenous state.—I felt certain from the symptoms, that the brain would indicate disease, and nothing could be more convincing, than the appearances when the calvarium was removed:—the most expert anatomist, could not have injected the millionth part of the vessels which covered the membranes, and the surface of the brain: it appeared indeed, as if the whole was nothing but a mass of blood vessels, and every little branch, seemed so entirely distended and glutted, as if one drop more must have ruptured it:—there was no effusion of fluid on the surface, nor in the ventricles. In the space of 20 or 30 hours, therefore, you see, there is not only formed a true congestive disease, but inflammation, and even

gangrene have taken place. He adds, "these comatose patients uniformly die."

In the valuable work from which these extracts are taken, many other accounts of appearances on dissection are given, but they are so similar to those already described, that it is unnecessary to detail them. I have also consulted many dissections, recorded by the medical officers of this establishment, and obtained similar results. Marks of inflammation in the liver are, likewise, not unfrequently noticed—in several instances, the same appearances were found in the heart and lungs. The usual inflammation, in the stomach and intestines, is evidently least remarkable in the most rapid cases, and, on the other hand, in those, which linger out several days, they are invariably found, in a very considerable degree.

The information derived from the preceding observations, is evidently of the most important and valuable nature ; they uniformly shew, that a high degree of venous congestion, prevailed in the internal organs in general, and they no less distinctly prove, the existence of that universal tendency to inflammation, which has already been frequently adverted to."

CHAPTER III.

THE CASE OF THE AUTHOR, WITH CIRCUMSTANCES
ATTENDING THE ATTACK: FROM WHICH THE
CAUSE IS INFERRED. WITH REMARKS ON THE
TREATMENT PURSUED. ETC. ETC. ETC.

Having given a most ample account of the symptoms, and their progression, and appearances noticed on dissection, I beg to be permitted to present my own case, as it was strict attention to the progression of the symptoms under personal experience, that enables me now to offer, what I hope will be found, a satisfactory explanation of the whole phenomena of the disease: which I am of opinion, has only been wanting, to reconcile the apparent incongruity that at present prevails in practice; and to enable to define, if not a determinate rule, at least the principles which should govern us in the treatment. For as Mr. Chapman justly observes, at folio 181, of the Madras Medical Report,—“As is the case with other diseases, so it is with cholera, as long as we continue ignorant of its pathology, so long may our practice be conducted upon an erroneous principle, and consequently prove far otherwise than successful; or the adoption of our remedies, must be a matter purely

of experiment.”—Added to which consideration, there are circumstances connected with the attack, which I am of opinion severally deserve notice, in reference to the cause of the disease.

The subject of this case, ætat. 34 ; 12 years in India ; of spare make, and delicate state of health. The 16th of October, 1828. For the past week has felt tolerably well, though for some days past has been subject, on the slightest exposure, to catarrhal attack. The bowels this morning were healthily relieved, and he felt well during the day, dining at 2 P. M. off roast mutton with rice, and drinking therewith three glasses of good sound sherry. At 5 P. M. he took as usual a tepid bath, and subsequently spent the evening in a quiet way at a friend's house, at half a mile's distance : where he made an abstemious supper (usually called dinner) of light soup, with a mouthful off the breast of a snipe, and dried toast ; and drank a couple of glasses of good sherry.—It having rained hard an hour before, and the weather being damp and cloudy, he returned home in a palankeen.—On going to bed at 11, he felt well, but a little fatigued, which he attributed to want of rest ; his usual hour of retiring being nine o'clock : he now exposed himself, as it was his customary practice, to aerial influence, whilst he rubbed himself well with a coarse towel. On this occasion, the windows being open, as was usually the case ; and the weather at the same time damp and raw ; he distinctly remembers having felt a passing chill, and a thought at the moment came across the mind, that exposure in this way at all times was hardly prudent : but in getting into bed he soon fell asleep,

and continued so till about 1 a. m.—when he awoke, suffering from a sense of distention, and oppression at the præcordia, which attributing to flatulency, he endeavoured to relieve by sitting up in bed, and rubbing the abdomen; but this affording no relief, he got out of bed, with the intention of taking a little brandy and water—when he immediately felt an urgent propensity to stool, and as the commode was at hand, almost as instantly passed a copious fluid dejection, without the slightest pain or uneasiness; but with no relief to the abdominal oppression; on leaving the commode, he suddenly felt giddy, which went off on assuming the recumbent posture, but left him sighing, the pulse exceedingly weak, the voice subdued and feeble, the extremities cold, and with a remarkable thrilling sensation, or feeling of nervous tremor in every fibre of the body, but more particularly experienced in the extremities: he now took half a wine-glassful of brandy with double the quantity of hot water; although a little wind was expelled from the stomach, it afforded no relief to the præcordial oppression; he therefore swallowed 12 drops of oil of peppermint, in a tea spoonful of sugar; but as no relief was experienced, warm flannels were applied to the belly; these felt hot to the part, but afforded no relief; another copious fluid brown dejection was now passed, which was almost immediately succeeded (I believe from assuming the erect position)—by vomiting—of a small quantity of mucous fluid with the peppermint: presently afterwards a desire was again felt to stool, but being restrained, the stomach appeared immediately to sympathise, and ejected with some force

its contents, consisting of about 6 ounces of ropy mucus, enveloping a small quantity of indigested rice, which tasted very sour. The vomiting occasioned a singing noise in the ears, and sense of great exhaustion, with sighing and oppression of breathing: which was only relieved by the unceasing use of the punkah. Ten minutes afterwards the following draught was taken.

R Ammon. Carbon. gr. x.
Magnesiæ ʒi.
Magnes. Sulph. ʒiij.
Aquæ ʒiij. mft.

This induced an agreeable warmth in the stomach, but no expulsion of flatus, nor did it afford any relief to the præcordial oppression, which continued unabated, although hot flannels had been constantly applied. Another evacuation was now passed, and soon after a desire was again felt, but being uncomplied with, the stomach became again sympathetically excited, and the draught which had been taken now about a quarter of an hour, was thrown off, much diluted with a flocculent colourless fluid, tasting strong of the ammonia. Vomiting was in this instance attended with a little perspiration, but of very transitory duration; and there was a little relief felt of the præcordial oppression. A few minutes afterwards, a couple of clysters of a solution of salt in warm water were thrown up the bowels; which were succeeded by a copious flocculent mucous fluid evacuation: this afforded slight, but sensible relief to the abdominal oppression. Shortly afterwards, on attempting to sit up, faintness came on, followed by vomiting of a mouthful of mucous fluid, singing noise in the ears, and feel-

ings of great exhaustion. The præcordial oppression being still great, the clysters were repeated, and continued at short intervals—as they were generally succeeded by evacuation, which always afforded more or less relief. As the abdomen felt hot to the hand, and there was some thirst now experienced with desire for cold drink—a wine glassful of cold water was taken, and repeated every half hour, with great comfort, and no subsequent vomiting. The warm salt water injections at short intervals, with the cold water for drink, and the constant use of the punkah, were continued from this time, about half past 3 till 6 o'clock—with progressive relief to the præcordial oppression, which still continued considerable, and with general amendment—when an increase of thirst being experienced, with sense of preternatural heat of the extremities, the clysters were discontinued; and a drachm of Cheltenham salts dissolved in 4 ounces of water was taken, and the same dose repeated 2 hours afterwards: by which pretty copious, colourless sero-mucous evacuations were continued to be passed at short intervals, with gradual relief of the præcordial oppression, and comfortable feelings of amendment. At 9, a. m. a cup of tea was taken, but the milk in it soon after becoming sour, occasioned nausea and oppression of stomach, which continued a couple of hours. The heat of skin having progressively increased, at 11 o'clock the following pills were taken, with a claret glassful of cold water, and the latter was repeated occasionally afterwards, ad libitum.

Rx Hydr. Submur.

Pulv. Antimon. aa. gr. ij.

Extr. Coloc. Co. gr. vj. mft. Pil. ij.

I must observe, that after 10 o'clock, the evacuations which continued to be passed every half hour or so, became less copious, thicker, and somewhat of a fœculent tinge : at 2, they became decidedly bilious, but containing many floeulent shreds. At 10, urine was voided for the first time : at about which time it was noticed by an attendant, how wasted and shrivelled the fingers appeared, and on examination the toes appeared so likewise ; the digits of both extremities, feeling at the same time inflexible and contracted.—4 p. m.—Since 2 o'clock a little moisture has been felt about the feet and palms of the hands, the feelings having since become proportionately comfortable, and spirits buoyant ; there is still a little præcordial oppression experieneed, but less thirst ; a little appetite too is now felt ; tongue slightly coated ; the pulse too has much increased in volume, and diminished in frequency—in the recumbent posture it is 84, sitting up in bed increases it 20 beats in the minute, and giddiness is felt.—8 p. m.—Half a cupful of broth was taken at 4 o'clock, but the feelings were an hour after, that it had been better omitted ; an oecasional wine-glassful of water only, has therefore since been taken, and which it is the intention to continue throughout the night ; the stools are frequent, watery and bilious ; præcordial oppression greatly relieved, and feelings generally comfortable.

Repet. Pil.

18th, 6 a. m. The air being calm and oppressive, the attendance of a servant to fan the patient was required throughout the night—by which he rested, and slept for a few hours at intervals, having to get up frequently to stool : the evacuations continue as

limpid as water, are green, but contain some mucus and a few floeculent shreds; they are passed without griping, but occasion a good deal of irritation about the anus: feelings comfortable; but on rising feels giddy and weak; pulse soft and weakly; skin a little moist. Some sago was now taken; and a dose of Cheltenham salts two hours afterwards. From this time the convalescence was rapid, the diet being light, and proportioned to the weak state of the digestive organs.

I have only to add, the narration up to 4 p. m. of the 17th, was recorded at that hour, whilst fresh on the mind, by my apprentice, who had been in attendance on me the whole of the time; and I may assert truly, is a most faithful statement.

I beg to observe, that during the whole of the time being in possession of my senses, the remedies prescribed, were dictated more by my feelings than by any preconceived opinion, which soon convinced me, the præcordial oppression was from the eongestive state of the stomach and bowels—as the stimulants I took, afforded no relief in this particuar; whereas the evacuations invariably did so, more or less: the irritating clysters were therefore obviously indicated, not only with this intention, but in relief also of the stomach—which was twice suddenly excited to vomiting, by restraining the action of the bowels: the latter is therefore, I consider, a most obvious curative indication—indeed, I felt this so much to be the case, that I pursued the hint, and have reason to suppose, my rapid recovery attributable.—Had I, on the contrary, restrained this, by opium and stimulants, which has been too commonly the practice, inflammation would have

become developed, with its attending symptoms, burning heat, and extreme irritability of stomach ; restlessness, and so forth ; or spasms with their exhausting influence ; or the absence of these symptoms, and the non-development of excitement from cerebral congestion.

I have been somewhat diffuse in the detail, particularly with regard to state of system, and circumstances prior to the attack ; as in seeking for the cause of a disease, attention to minutiae of this kind is indispensable ; this conviction calls upon me for some other remarks, which will, I trust, be considered not altogether irrelevant. In the first place, there could be no doubt regarding the nature of the attack, the diagnostic symptoms as they have been considered, of sero-mucous or conjee water-like evacuations not only being present, but accompanied with the other striking characteristics of the disease—sudden invasion, extreme prostration of strength, &c. &c. The weather, I would next observe, was wet, cloudy, and oppressive ; such as usually precedes the setting-in of the monsoon, a period during which generally, the cholera has been more frequently prevalent. I shall now mention as coming under my own immediate observation, and not undeserving notice, as I cannot help connecting it with the cause of my attack, a remarkable coincidence, of what may be supposed, atmospheric deterioration in some way at this time. That for a week before, there had been a singular epidemic disease among the poultry in my compound, and in the neighbourhood—not of the chicken-pox character, to which poultry are subject ; but poultry in a state of apparently the most perfect health were suddenly

seized, drooped, and died in an hour or two. In the course of three or four days, one of my servants lost eleven of twenty-eight fowls ; and the whole of his ducks, consisting of five old birds. The other fowls would probably have died also had he not sold them ; as another servant lost in two or three days afterwards, twelve out of fourteen ducks ; and nine of fifteen fowls, the remainder she sold : the greatest loss she sustained, was the night prior to my attack. One of the dead ducks the day before was brought for my examination, when I found the whole of the inner coat of the intestines, from the gizzard downwards, in a high state of inflammation, and filled with mucus. I observed to the servants at the time, that it had died of cholera, and warned them to take care of themselves. Connecting this with the fact, not unfrequently noticed, that during the epidemic visitations of cholera, a like mortality has prevailed among cattle—atmospheric deterioration as a cause, may be fairly inferred. Mr. Chalmers remarks, at fol. 142 of the Madras Report, “It is a curious fact, that in the towns near the hills, where the epidemic was so fatal, a disease occurred among the cattle, which kept pace with, and often exceeded in mortality that of the human species.” Dr. Ranken too observes in the 74th No. of the Med. and Phys. Journal, “At Rajputana, during the epidemic prevalence of the disease, the brute creation did not altogether escape the sickness of the period ; many camels, and goats in particular, having died of violent diarrhæas and other ailments.” The collector also of this district (Madura) authorizes me to assert, that in numerous instances, and from various parts of the collectorate,

the like was not only reported to him, but urged by many of the riots or farmers, as a plea for the remission of their kists or revenue dues. And the same I also heard was the case in the Coimbatore district.

Taking all the circumstances into consideration, I cannot help attributing my own attack, to the operation of some terrestrial exhalation, under the circumstances of exposure before mentioned; which exhalation was evidently of a local character, from its limited extent of operation; and which, I cannot now help, connecting with a nullah, that runs at the back of the compound in which my house was situated: ditches and the like being not unfrequent sources of malaria—which I assume to be the cause of the disease, whether I have established the fact, or not, in this case: but having assumed such to be the case, I purpose, in the next chapter, to adduce the grounds on which the conclusion is founded; after making some necessary preliminary observations, regarding its nature and sources.

CHAPTER IV.

SECTION I.

ON MALARIA—MEANING OF THE WORD DEFINED :—
 ITS VARIOUS SOURCES, AND CIRCUMSTANCES
 FAVORABLE TO ITS DEVELOPMENT—THE PRO-
 BABLE MODIFYING CIRCUMSTANCES, OF ITS BEING
 PRODUCTIVE OF CHOLERA IN ONE INSTANCE, AND
 OF FEVER IN ANOTHER : THE STRIKING RESEM-
 BLANCE HOWEVER POINTED OUT BETWEEN THESE
 TWO AFFECTIONS. ETC. ETC.

By malaria, we mean a mephitic vapour—the gaseous production of organized substances in a state of decomposition. For the term is equally applicable, in the present state of our knowledge to the noxious gases originating in animal putrescence giving rise to fever and a like result, as to those emanating from vegetable matter : although the latter, abounding to such a multiplied extent, is doubtless its most prolific and common source. And it may be further noticed, that vegetable substances circumstanced and so situated, for the most part abound in animalculæ, and other varieties of the insect tribe of ephemeral existence—that there is no knowing, to what extent the decomposition of these, may influence the resulting exhalation : indeed Dr. Armstrong, in his lectures published in

the *Lancet*, observes : “ the formation of this miasm, seems to be connected, with a certain degree of moisture and warmth, favoring the decomposition both of animal and vegetable matter. Dr. Dwight, an American divine and traveller, has made the nearest approach to the discovery of this subtile agent. When on his travels about the lakes of America, he found, that typhus did not prevail, round the margin of lakes which were fed by natural springs, and which were bright upon their surface ; but on the contrary, it did prevail round the margin of those artificial lakes, which not being thus fed, were not only dull upon their surface, but covered occasionally by a dirty film : which on experiment he found to be, the putrefactive product of animalculæ, which are existing in vegetable matter.” For to this, as a variable agent; the conjoint operation of circumstances, or system to its development—thus modifying the result, it is, that we must look, to the effects being in one case fever, and in another cholera.

A high, or low temperature of atmosphere, may be a modifying circumstance. And elevation of temperature, may be a favourable predisposing cause, to the result being cholera, which has been so fatally prevalent of late years in India ; but it is not this simply, or the disease would be confined to such latitudes, which is not the case, as I shall adduce, a most striking instance of its endemic prevalence, of recent occurrence in this country—at Clapham. It is true, this occurred in the month of August, but at a time, when the thermometer was far from ranging high : and it may be further observed, that in places so situated, that is in high

latitudes, fevers are of as common occurrence. The same objections obtain as to cold, or humidity, as well as to variety in the electrical condition of the atmosphere.

That malaria, I think it reasonable to suppose, is a variable compound, the consequences resulting—being thus modified. For were the nature of the disease, to depend simply on quantity, or intensity of the same influence, we might expect the two diseases in an epidemic visitation of either, prevailing in common; corresponding with the locality, or particular circumstance of situation and the like of the patient; which is not the case. Whereas, corresponding with intensity of influence, and susceptibility to impression have we, severity of grade of disease—whether of cholera, or of fever—marking their species, or varieties.—The connection, however, between the two diseases is very intimate, for the fact is undoubted, that fever has not unfrequently succeeded, or has been conjointly prevalent with cholera, during its epidemic visitations; though for a certainty, it has not been of usual, or common occurrence.

There is, however, another modifying circumstance, which I believe to be of no unfrequent operation; and which on reading the numerous reports on the disease, it will be perceived, has often been mentioned as an exciting one—I mean cuticular capillary torpor the effect of exposure, and which I believe to have been the immediate cause of my own attack—not that I consider this effect, whether induced by the more immediate or direct influence of the morbid cause on the capillaries of the skin, or as an effect of cold under exposure, essential to

the development of the disease, but rather look upon it as an accessory cause, by which greater effects, or cholera is induced, by the operation of a less virulent cause, than ordinarily gives rise to this affection.

For I believe, the true state of the case will be found, that malaria giving rise to fever, in general is of a milder species ; hence it is, that after its absorption, and the blood's contamination, its effects are not manifested in many cases till a distant period, or some accessory agency or exciting cause develops its action.

Indeed, while numbers are exposed to the operation of the same influence, why few comparatively become the subjects of disease—I believe attributable, to the energies of the system, in persons of moderately robust health, being equal to bear up against its immediate effects—the purifying offices of the liver, and other excretive functions, divesting the blood, and system of its deleterious influence, before it has time to produce any marked or determinate result: though debility and less perfect health it may be supposed, would be felt more or less by all so situated, and which I believe is the case.

Whereas in cholera, either from the greater virulence of the poison, or its simultaneous direct influence, in torpifying the function of the nerves, and capillaries exposed to its operation; or that of cold, under circumstances, favourable to its producing the same effect—the effect is more immediate and intense.

For the common origin of the two affections, in all essential or cognizable particulars, the testimony

I shall adduce, will, I am of opinion, place beyond doubt. That with the following observations, which support the views here taken, of difference of effect, being but in degree of virulence of the mephitic exhalation, or consequences analagous, as before noticed, and which will be hereafter more particularly explained—I shall dismiss the subject.

In the primary actions of disease, the resemblance in all the essential characters, that exist, between cholera and fever is most striking—so much so, that it has been noticed by several practitioners in India, that the former appeared to them, a protracted, or continuance of the first or cold stage of the latter—which in its essential character, I believe it to be—the efficient cause, or causes, operating with greater intensity or virulence—so depressing the vital functions, that reaction of the system but seldom, or very partially takes place : whereas, in fever, the energies of the system not being equally depressed, excitement becomes developed to its preservation.—In fine, the resemblance between cholera and the congestive typhus of Armstrong, is so striking in all the leading features of the two affections, that they present to my mind, but one, or modifications of the same disease.

From what has been said, in reference to the diseases arising from the inhalation of the gases emanating from animal decomposition ; I beg to adduce the following quotations from Dr. Johnson's *Medico Chirurgical Review*, in the 6th No. it is mentioned, “ That upon a grave near Canton being opened, wherein a body had been interred about two months before, such noxious emanations instantly arose, as to cause the man, who was employed in the work,

immediately to sicken, and soon after to labour under typhoid symptoms, that exactly resembled those of true plague ; and that to two soldiers the fever proved fatal." Foureroy remarks, "that in some of the burial-grounds in France, whose graves are dug up sooner than they ought to be, the effluvium from an abdomen suddenly opened by a stroke from the spade, strikes so forcibly upon the grave-digger, as to throw him into a state of asphyxia if close at hand ; or if at a little distance, to oppress him with vertigo, fainting, nausea, loss of appetite, and tremors for many hours : whilst numbers of those living in the neighbourhood of such cemeteries, labour under dejected spirits, sallow countenances, and febrile emaciation."

Dr. Christison in his late work on Poisons, observes, "Putrid animal matter, when injected into the veins of healthy animals proves quickly fatal ; and from the experiments of Gaspard and Magendie, and the more recent researches of Leuret and Hamont, the disease induced, seems to resemble closely the typhoid fever of man. Similar effects were observed by Magendie when dogs were confined over vessels in which animal matter was decaying, so that they were obliged always to breathe the exhalations." fol. 476.

It is, however, as I before said to vegetable matter, which abounds to such a multiplied extent all over the earth's surface, in a state of decomposition that we must look, as the grand laboratory, or source of malaria. And as a certain degree of moisture appears essential to the process of decomposition, the most prolific sources of this poison, for so it may be well called, are found to be, on the margin

of rivers, pools, tanks, ditches or drains, marsh or swamp—whether natural or artificially such—as rice grounds ; forest or jungle—in short, wherever vegetable substances or products are to be found, even in a cellar, or on shipboard, if exposed to the operation of moisture, by which decomposition ensues. And the same obtains with regard to dunghills, privies, or wherever animal products or substances are to be found.

Heat, it is however to be observed, is an accessory agent of no mean importance, facilitating, both decomposition and exhalation ; hence it is, that in hot climates, the diseases of malaria more particularly obtain, or assume the most aggravated forms. And on rainy weather, succeeding to hot summers in more temperate climates ; from the conjoint operation of heat, wet, and abundance of material which exists at this season, these diseases become much more extensively prevalent.

SECTION II.

EXTRACTS FROM VARIOUS SOURCES ADDUCED IN
PROOF OF MALARIA BEING THE CAUSE OF CHOLERA
IN INDIA: AND DIRECT EVIDENCE OF ITS HAVING
BEEN SO, IN A RECENT INSTANCE IN THIS COUNTRY.
ETC. ETC.

Dr. Macculloch, in his work on the diseases of Malaria, relates the following fact : a most striking instance, and strong argument that this disease is occasioned by some terrestrial exhalation, which

may be well called malaria, whether the product of animo-vegetable decomposition, or otherwise, we will at present leave out of the question.—“A frigate had cruised long on the coasts of India, where this disease was raging on shore, retaining her health however, and, as was believed, by rigidly avoiding any communication with, or even approach to the land; the captain’s conduct in this respect having arisen from his experience of African fevers.—Being on one occasion at anchor about three miles from the shore, the landwind came off to the vessel, and with such effect, that the usual smell attending malaria, well known to the officers and men from their African experience, was immediately most sensible. There was not at this time a sick man on board, while there had been no communication with the land for many weeks—and the alarm being immediately taken, the vessel was ordered to weigh for sea; while, as had been the constant practice, every man not wanted on deck was ordered below,—for the purpose of avoiding the effect of malaria, thus blown off to sea in the manner which I have described in the essay on that subject. An accident having happened to the iron cable, the armourer was the first man employed, almost alone, on deck, in disengaging it; and though in perfect health when he came up, he was immediately seized with giddiness, was quickly rendered incapable of proceeding with his work, became insensible within three hours, and died of this cholera, which also seized on four of the crew before the vessel could get under weigh; the whole of them dying in the same manner.”—Dr. Macculloch adds, “such evidence as this, seems to establish that a malaria is

the cause of this cholera also, to whatever circumstances it may be owing, that the produce is not the usual fever. And if so, it may be conceived to be in a state of unusual activity or virulence;" or as he afterwards says, "If it is not the same malaria which produces fever, and the disease is not a mode of that great class, there must be malarias of different chemical natures, capable of producing very different disorders,—and thus will each variety be productive of its specific disease, as the different contagions are; though should this appear groundless or false, we must rest in the original belief, that these different disorders depend, severally, on quantity or virulence, or on collateral circumstances influencing the body as predisposing and modifying causes, since we have but that apparent alternative."

—A case very analogous to the foregoing adduced by Dr. Macculloch is mentioned in the Report of the Madras Medical Board, at fol. 23: the following is an extract.—“During the prevalence of cholera at Madras, the crews of two ships—the Fairlie and Coutts then in the Roads, became the subjects of the disease, but it did not appear on board the Coutts, till a fortnight after it had prevailed on the Fairlie,—and it was noticed that, “the men who worked upon deck, and those who slept to the landward side of the ship, were on both vessels, decidedly the most obnoxious to the attacks of the disease.” I shall observe upon this hereafter.

I shall now adduce some facts, illustrative of the cause being of local origin.—Mr. Chapman reports to the Board, as recorded in the before mentioned work, at page 197, “A very curious circumstance as connected with the probable remote cause of the

epidemic cholera, occurred, whilst we remained at Cape Comoriu. Although little cholera was at this time prevailing among any other class of people, it became remarkable, that the grass-cutters of the escort were frequently attacked, and, that, usually in the evening, after having gone to a tank to cleanse their grass. On one occasion, two grass-cutters had been together at this tank, at the same time; they were both attacked on the same night, at the same hour, and died on the following morning. Out of eighteen grass-cutters, we lost five, besides others being affected, in the space of three weeks; it was presumed, that the circumstance was in some measure connected with the putridity of the water contained in the tank, and which certainly bore every appearance favourable to such an idea, being scarcely passable from the nauseous effluvium which it evolved. The impression made upon the minds of these individuals themselves, was corroborative of this opinion: the tank was spontaneously deserted by them, and no case of cholera occurred during a subsequent period of nearly nine weeks' stay at the same place."

In the 5th page of the same work, it is reported, that "during the prevalence of the disease in Col. M'Dowall's camp near Malligaum, the 17th regiment N. I. which composed part of this force, and its followers entirely escaped the disease. Over the ground of its encampment, which was situated between two hills, a strong current of air is said to have been constantly blowing. The European regiment which suffered severely by the disease, and formed a part of the same force with the 17th, was encamped on lower and more confined ground,

and when the cholera declined, a malignant bilious remittent fever became very prevalent in the corps."

In the 8th page of the same work, it is said, "It commenced its course in the district of Coimbatoor, towards the end of November 1818, and soon became very prevalent and destructive in the villages situated in the vicinity of the Cavary River. The endemic fever existed during the prevalence of cholera, and as the latter disappeared, the former became pretty general throughout the district."

Mr. Goldie reports, at fol. 43.—"From the different reports I have received, and the best observations I have been able to form, the epidemic has been comparatively mild in its effects on the coast, and its vicinity, and its violence increased as we advanced into the interior, particularly on the banks of rivers; and its fatality was most conspicuous in the vicinity of hills, and such places, where the endemic fever of the country is known to prevail."

Mr. Cother reports, at page 140.—"As far as regards number, it would appear that this awful visitation has been very favourable in Ramnad and Shevagungah, in comparison with others on which they border: generally speaking, the cholera has been observed to take the course of the rivers, more or less; and has always been more destructive in villages whose situations are low, and contiguous to wet paddy fields. In some of the largest and most populous places whose sites are elevated, it has not as yet appeared at all, though at the distance of only ten or twelve miles; in places otherwise situated, it has been very prevalent."

Mr. Dean, at folio 89 of the Madras Report, says, "From all I have heard, high and elevated situations are less exposed to this disease than others; not one case occurred in the parties of troops stationed in the hill forts of Trimbuck, and others in Candish, during the last season; and although the disease appeared in the lower fort of Aseerghur, at the commencement of the present rains, in the battalion of Sepoys stationed there, and killed some, yet the Europeans stationed in the upper fort did not suffer; but in a party of Europeans invalided and marching to Jauluah, the disease attacked them and several fell victims to it."

Mr. Chapman's Reports at page 182.—"In conformity with epidemics generally considered, the spasmodic cholera is dependent on some change induced in the atmosphere, by the solution of some noxious matter, there can be no reason to doubt; but to point out the precise nature of this matter, or from whence it is derived, must ever be attended with infinite difficulty; the more especially, as the variations of the barometer afford us no assistance. In its effects however upon the functions of the body, it appears to resemble very forcibly, those which are produced occasionally by the accidental inhalation of carbonic acid gas, and this particularly in that direct depression of the powers of life, which uniformly ensues, from the moment that an individual is affected with this disease. This effect is precisely similar to the poison of carbon, cases of which are sometimes exhibited to us, by persons who have incautiously descended wells, or slept in apartments with charcoal fires, and the idea of the similarity of the two affections, is considerably

strengthened by the observation, that low and damp situations, are those in which the disease most frequently occurs. I am not prepared at this moment, however, to continue the discussion upon this subject, or to shew that the nature of the change, which the atmosphere undergoes in its production of cholera, is depending on a superabundance of the material carbonic acid gas, but this opinion was very strongly suggested to me, by the impression first made upon my mind, in witnessing this disease. From whence the superabundance of this material, can within these few years suddenly have been derived, it is very difficult to determine ; but it is more than probable, that it is in some measure connected with that vast quantity of stagnant water, and other putrid matter distributed in every district of the enormous continent of India ; and it hence becomes a question how far the clearance of such noxious agents may be attended with a direct annihilation of the disease in question ; certain it is, that in the marching of troops, it is of the utmost importance to the safety of the camp, as connected with cholera, that the highest ground should be uniformly chosen, and a distance observed from all collections of water, to the utmost extent compatible with the necessary convenience to camp followers. In my march with the details of the 1st and 8th Light Cavalry to Scroor, under the command of Major Cameron, during the months of February, March, April, and May, I had occasion to observe the necessity of strict adherence to these particulars. No case of cholera appeared in camp until our arrival within a few marches of Chittledroog, when unfortunately having pitched on the banks of a

nullah, containing a large quantity of stagnant water, it was lamentable to observe that in a few hours from the time of our arrival, no less than 14 cases of Sepoys were admitted into the hospital suffering from the spasmodic cholera in its gravest form. I took an opportunity of remarking to the officer commanding, the probability of the disaster having been occasioned by the encampment in the situation above described, and I have the satisfaction of observing that much attention being subsequently paid to this in particular, the disease in a few days suddenly left the camp, and not three cases occurred afterwards, in a march of two months."

Mr. W. Scot remarks in fol. 39 of the same report—"We are thus furnished, on one hand, with arguments to prove, that the cause of cholera exists in the atmosphere; and on the other hand, with no less powerful reasons for thinking, that the morbid influence may be something arising from the soil, not generally and equably diffused throughout the air.—Ships arriving in the Indian seas ought to suffer under the epidemic influence of the air, if such influence really existed; but, it is certain, on the contrary, as already stated, that no instance has ever been recorded of the crew of a ship suffering from cholera, until the vessel has come into communication with the land."

It may be observed of the Coutts and Fairlie, that the cause of the crew of the latter having been attacked with cholera, at so much earlier a period than that of the former, might be attributable, to the positions of these vessels with regard to same locality and source of malaria, and which perhaps,

from the alteration in the direction of the wind at length extended to the other—this opinion is supported by numerous facts recorded by Dr. M'Culloch in his work in relation to fevers, he even mentions, instances of fever prevailing from this cause on the one side of a street, and from which the opposite side has been quite exempt—and the same has actually been recorded of the cholera. I have also the authority of Dr. Henderson, the surgeon of the regiment—for saying, that, during the prevalence of the disease in the 89th Regiment, in Fort St. George, in February 1828, it was entirely confined to one end of the barracks; the three companies occupying the upper floor of the north end, were the only sufferers: finding the disease to be daily increasing in these companies they were removed to a bomb proof, and it was observed, after this, not a single case occurred.—It has been noticed for some years past by different medical officers, that the men occupying this particular end of the barracks, have been more subject to attacks of cholera, than those occupying other parts of the same building; to account for which, several reasons have been assigned—which, it is deserving of notice, are just such that Dr. M'Culloch mentions, as being the most prolific sources of malaria.—“Its contiguity to the ditch of the fort, as also the men's privies, and cooking houses; and to a drain, running immediately under the north-west angle—which, at times is exceedingly offensive.”—There is another observation of Dr. Henderson's, that I am of opinion, too, is well deserving of notice, as a very probable modifying cause in relation to the disease it gives

rise to; these are his words,—“ I am much inclined to think, that the exposed situation of the barracks, to the keen, and sharp north-west (land) winds, scouring along the glacis, and directly into the rooms in question, is as likely to influence the attacks of cholera in these quarters as any other cause, and, appears to me, to have been the chief exciting one of the late attacks—as the nights, were exceedingly hot and sultry; while the mornings were cold and chilly, occasioned, by the setting in of a strong north-west wind about 3 o’elock, to which the men—many in a state of nudity, and exhaustion from the previous heat—were now exposed, and asleep at the same time.”

The same gentleman has kindly put me in possession of another fact, in proof of the local origin of the disease, and of the probability of its being from malaria.—He observes, “while in charge of the 13th Light Infantry in Burmah, in December, 1825, they were encamped along with the 38th and 47th, two of His Majesty’s Regiments on some jungly ground near Patnago—early in the morning, an officer of the 13th was attacked, and died in a few hours; one of the 47th shared the same fate, and the disease became general in the division; in 24 hours from 15 to 20 men fell victims to it. In the course of the following day, the divisions were ordered to take up new ground, on a height about a mile and a half in the rear, which was done in the course of the evening, and not a single case occurred, in either corps after this move.”

Instances I have already multiplied, perhaps without measure, but the subjoined I add, with the

view of bringing the subject more particularly under the cognizance of the residents of Madras, where these observations were made: and other places, but too numerous, where the same sources of disease abound. The late Dr. Peter Scott records to the Board, in the 19th page of the Madras Report—"certain local circumstances and peculiar states of the weather, appeared to have a considerable influence in occasioning the variations—dry clean open situations were obviously the most healthy; while most filthy situations, and such as were inhabited by the poorer classes, generally presented a great number of sick, and those frequently of a bad description. This was well illustrated at Vipery, in a situation abounding with stagnant water, the receptacle of every species of filth, but more especially at the spot, where I strongly suspect the epidemic first broke out at Madras, and where many fell victims to its severity, for, it was observed to be more prevalent amongst, and indeed for the first two or three days almost exclusively confined to, the natives residing in some huts, about which, much offensive and corrupted matter had been accumulated, while those occupying the houses almost contiguous suffered but slightly, though comparatively more, than the inhabitants in the adjacent and more distant streets." Dr. Scott also mentions, damp and exposure to have been influential causes.

FATAL CHOLERA AT CLAPHAM.

Extracted from the London Medical Gazette of August, 1829.

“On Friday, August the 14th, a son of Mr. Day, schoolmaster, at Clapham, aged about three years, having been previously in perfect health, was attacked with violent vomiting, purging, and convulsions. He became comatose, and died in three hours from the commencement of the attack.

“The rest of Mr. Day’s children, as well as his scholars, amounting in number to 30 boys, between 4 and 14 years of age, remained all well the next day. This being Saturday, several of the scholars went home, to spend Sunday with their friends, leaving in the school 22 boys: of these 20 were attacked, between 3 and 9 o’clock on Sunday morning, with vomiting and purging of the most alarming character, attended with a degree of prostration which threatened many of them with immediate death. The appearance of the matters vomitted was somewhat various in different individuals, depending probably upon the liquids previously taken. In some instances it was tinged with green bile, and was of a subacid smell, but in the great majority of cases it was colourless and inodorous. The stools also varied in appearance, but they were for the most part pale, consisting of mucus and muco-purulent matter, slightly streaked with scarlet blood.

“The pulse varied also very much in different individuals: in the early stages of collapse it was very frequent, but so feeble as to be scarcely perceptible. When reaction took place, it had, of course, more force, but less frequency. The skin was in most instances cold and clammy throughout; in a few cases it was for a short time hot, and the face was, in these, occasionally flushed. There was a low delirium in some advanced cases, with dilated pupils; but the sensorium was not affected in the greater number of them. None of the little patients complained of pain in the stomach or bowels, beyond the griping which preceded the stools. There was, however, in a few of them, slight tenderness and some tension of the abdomen; and, as far as the exact course of the symptoms could be ascertained in such a scene of confusion, it may be said generally that the disease seemed to come on very much like the tropical cholera, with a short obscure stage of excitement, which was immediately followed by a state of extreme collapse; and that this, under the use of stimulants, was succeeded, in those cases which were of the best aspect, by a stage of warmth, gentle moisture, and general reaction. We have mentioned that the disease was accompanied pretty generally with convulsive action of the muscles; but it may be of importance to remark that this, which amounted rather to a kind of twitch, or subsultus, than to cramp, was confined to the upper extremities.

“Such was the afflicting state of circumstances in this unfortunate family up to the afternoon of Sunday. Dr. Spurgin and Messrs. Angus and Saunders, of Clapham, who had been employed from the first

in rendering every possible assistance, now requested the co-operation of Dr. P. M. Latham, Dr. Chambers, and Mr. Pearson. At this time another of Mr. Day's sons was evidently sinking, and a third, as well as several of the pupils, were in a state of dangerous collapse; others, again, although not out of peril, were rallying from the attack. The first question that suggested itself to the minds of the medical men in consultation was, whether the symptoms were referable to any poison received into the stomach. The scrutiny, however, which was instituted with reference to this point led to nothing satisfactory at the moment. It was then determined to examine the body of the little boy who was the first victim of the disease, and who, it will be recollected, died in three hours after he was attacked by it. On laying open the abdomen, the viscera presented themselves in a remarkably healthy state, as far as external appearances went. The liver was of a perfectly healthy size and colour; the gall-bladder was somewhat distended with healthy bile; the peritoneum, throughout, pale, transparent, and perfectly free from any appearance of thickening. On laying open the small intestines, however, it was observed that the peyerian plexuses of mucous glands were enlarged in patches throughout the intestinum ileum, raising internally, without destroying the mucous membrane covering them, into condylomatous elevations: lower down in the small intestine a few of the *glandulæ solitariae* were similarly affected, and in the ascending colon and transverse arch these latter glands seemed almost universally diseased, giving an appearance of pustulation, or rather tuberculation, to the whole inte-

rior of the bowel ; the interstices of the tubercles here, as well as in the small intestine, being entirely free from vascularity. The mesenteric and mesocolic absorbent glands in the neighbourhood of the parts most diseased, were congested and enlarged. The stomach was quite healthy. The viscera of the thorax were likewise quite healthy. The contents of the cranium also, which were carefully examined, were entirely free from effusion, or other trace of disease.

“The treatment which had been adopted, and which it was determined still to pursue, was in the first place, to obey the great indication of preserving life by administering stimulants with opiates to those who were sinking from exhaustion and spasm. In the few instances in which the head seemed in the course of the reaction to be affected, it had been deemed right to relieve this symptom by the application of a few leeches to the temples. Besides these means, it was found necessary to apply mustard poultices to the abdomen, and to wash out the bowels with enemata, administering afterwards full doses of calomel and opium.

“Early on Monday another of Mr. Day’s sons, a boy of four years of age, sunk under the attack, 23 hours after its commencement. His body was carefully examined a few hours after his death, and exhibited the following appearances :—

“The abdominal viscera, when first exposed, appeared (as in the former case) perfectly free from the traces of inflammation or other disease.

“The examination of the bowels was commenced with that of the *intestinum ileum*, in which the mucous glands, both aggregate and solitary, were

found generally enlarged, and the mucous membrane covering them in many places ulcerated. The interior of the cœcum, colon, and rectum, however, exhibited no appearance of diseased mucous glands, although the membrane itself was throughout uniformly congested, pulpy, and very easily separable from the subjacent tissue.

The examination was now pursued upwards from the ileum : the jejunum at the lower part was less diseased than the ileum, and as it approached the duodenum was more and more healthy ; the duodenum, however, on being laid open, exhibited a pustulated appearance, depending on enlarged follicles, very similar to that of the colon in the former case. The mesenteric and mesocolic glands belonging to the diseased portions of bowel, were enlarged and more vascular than natural. The liver was also quite healthy ; the gall-bladder contained more than an ounce of perfectly healthy bile. It was remarkable that the contents of the bowels were nearly colourless, and had no fæculent, or indeed any other peculiar odour. The stomach was perfectly healthy. The viscera of the thorax were likewise quite free from disease. In the head, the ventricles of the brain were distended with about three ounces of serosity ; and the sinuses were somewhat more charged than usual with dark-coloured blood. The brain and its appendages were not otherwise diseased.

“Most of the boys were removed by their friends in the course of Monday ; many of them in a very alarming condition. We shall lay before our readers, next week, what farther particulars we are able to ascertain with regard to the causes and results of

this event. The different articles of food, and the contents of the alimentary canal, &c. were placed in the hands of the gentlemen on the spot, for the purpose of chemical examination."

In the next week's Gazette was added :—

"The food and drink of the boys at the school at Clapham, as well as the contents of the stomach and bowels, were carefully examined by Dr. Burton, the Chemical Lecturer in the Borough, and no poison or other cause of disorder was detected in them.

"It is now ascertained that a very foul drain, or cesspool, the situation of which was not previously known, behind the house, was accidentally opened, in making some alterations about the grounds, a day or two before the disease occurred: the contents of this receptacle were taken out and thrown into a garden adjoining the play-ground, and separated from it only by a low and slight open paling. From this source it cannot be doubted arose the whole evil. Whether the sulphureted hydrogen itself was the agent in producing this pestilence, or whether that gas was merely the vehicle of some more subtle and abstruse miasma, it is not easy to say; but that the boys were freely exposed to this effluvia (however unintentionally and accidentally) is quite certain, and that almost every one of those who had been in the play-ground were attacked by the disease, is also equally undoubted.

"We would beg to say that we have understood that the little boy who was the first victim of the disease, and who was said to have died in three hours after he was seized, was first attacked with vomiting and purging about six o'clock on Thursday

morning; at twelve, convulsions came on, and he continued in them until seven o'clock on the following morning, when he expired.

“No death took place after Monday, when the second of Mr. Day's sons died, and the rest of the boys were removed. All the latter recovered in the course of the week. It is remarkable that the younger boys were most severely affected, and that a man who actually fell into the cesspool escaped altogether.

“The appearances after death in the two cases which died, bore a striking resemblance to those delineated by Roideur and Wagler, as the results of the ‘*morbus mucosus*,’ which raged in Vienna between sixty and seventy years ago, and which probably owed its origin also to some analogous endemic effluvium. So far as the great intestine was concerned, the morbid change was very analogous to what takes place in the common fevers of this country.”

With the foregoing direct evidence I may venture to terminate the enquiry, and assume it as a fact, beyond controversy, that malaria is the cause of cholera, of the species we have now under consideration; which I beg to denominate congestive, as appearing to me the most appropriate with the the general phenomena presented by the disease to our notice—in conformity with appearances on dissection—and as pointing out to us, the most successful indications of practice to be pursued.

Since the above was put into the hands of the printer, a fact has been brought to my notice, which

I cannot resist mentioning; as it points out a source of the malaria kind, which would be little suspected. During the winter assizes at Hertford, four years ago, a boar-skin, which had a very offensive smell, having been introduced in evidence to the Court, many of the members, and other persons present on the occasion, were seized during the same night with cholera. The lady who related to me the circumstance, assured me, that three of the Council, who took up their abode in her house, were all of them attacked between the evening and the following morning, and were exceedingly ill. The medical gentleman who attended them, investigated the circumstances at the time, and declared this to have been the cause of their seizure; and which, we may add, is extremely probable.

CHAPTER V.

SECTION I.

OF THE CHEMICAL QUALITIES OF MALARIA.—THE EFFECTS OF THE NOXIOUS GASES ON THE SYSTEM.—APPEARANCES ON DISSECTION OF THE BODIES OF PERSONS KILLED BY EXPOSURE TO THE INHALATION OF MEPHITIC VAPOURS.—THE TEXTURES OR PARTS ON WHICH MALARIA PRIMARILY OPERATES.—ON THE RESPIRATORY AND CUTANEOUS FUNCTIONS, IN THE CONVERSION OF BLACK INTO RED BLOOD.—OF ABSORPTION.—OF THE CHEMICAL CHANGES THAT TAKE PLACE IN THE GENERAL CAPILLARIES OF THE SYSTEM.—THE SOURCE, NATURE, AND DISTRIBUTION OF THE NERVOUS ENERGY; AND OF VITAL TEMPERATURE.—OF THE IRRITABILITY OF MUSCULAR FIBRE, AND THE EMPTY STATE OF THE ARTERIES AFTER DEATH.—OF THE PASSAGE OF FLUIDS THROUGH CAPILLARY TUBES.—OF THE SYMPATHY BETWEEN THE HEAD AND STOMACH, AND THE LIVER. ETC. ETC.

THE fact I may say being established, that malaria is the cause of cholera; it will be necessary, with the view of tracing its effects on the system, in inducing the phenomena of the disease, that we should enter into some preparatory considerations before proceeding further.

The first question that arises, is, what is Malaria? I may briefly reply, that, as its most fruitful source, we believe to be, animo-vegetable decomposition—it is fair to suppose it some gaseous compound of carbon, hydrogen, and nitrogen, as these are the principal constituents of such substances; and as experiments have proved, such of the gases to be highly deleterious to animal life, observation is perhaps alone wanting, to identify it with one, or some compound of these.

Of carburetted hydrogen it is said, in Nicholson's Chemical Dictionary—"That in hot weather, it is formed at the bottom of stagnant waters, and may be readily collected at their surface by inverting a bottle of water over the pool, and at the same time stirring up the mud at the bottom, to disengage the gas. This gas generally contains a portion of carbonic acid mixed with it. Both of these gaseous fluids, are produced by the decomposition of water, by putrid animal and vegetable matter." Now of carburetted hydrogen—Murray, one of our best writers on the *Materia Medica*, observes—"This is one of the most active of those gases, which operate by depressing the functions of life.—Even when largely diluted with atmospheric air, it occasions immediate vertigo, sickness, diminution of the force and velocity of the pulse, reduction of muscular vigour, and in general every symptom of diminished power. It cannot be breathed in an undiluted state. Davy found at the third inspiration, total insensibility was induced, and symptoms of extreme debility continued for a considerable time.—These effects prove its position deleterious agency."

And of one of the gases known to be given out

by the decomposition of animal matter, in privies, cesspools, and the like—sulphuretted hydrogen. Dr. Christison, in his late work on poisons, observes, that it is, “the most deleterious of all the gases, according to Thenard and Dupuytren, air impregnated with a 1500 part of this gas, kills birds in a short space of time; and with about twice this proportion, or an 800 part, it will even kill a dog. Some time before these researches, Professor Chausier made experiments with it on animals; and he remarked, that in moderate quantity it proved quickly fatal; whether it was inhaled, or injected into the cellular tissue, stomach, or anus; or simply applied to the skin—the last important fact has since been confirmed by Labkuchner, in his Thesis on the Permeability of the Tissues.”

Now as chemistry furnishes us with numerous other of these gaseous compounds, alike inimical to animal existence: although we are incapable of identifying the particular species, a knowledge of the foregoing facts, affords us sufficient insight into their nature, and of malaria, for all our purposes: a single inspiration of which, Dr. Macculloeh mentions, having been known to produce apoplexy and death.

There is another fact I shall hereafter observe upon, that has been noticed in making experiments with the noxious gases upon animals, which is, that in animals destroyed by exposure to such agents—“the irritability of the heart is entirely destroyed.” Dr. Christison also observes—“The appearance in the bodies of persons killed by these emanations, are fluidity and blackness of the blood,

a dark tint of the internal vascular organs, annihilation of the contractility of the muscles."

The next question that presents itself, is, upon what parts, or textures of the body, are the primary operations of malaria exercised? Now as the skin and lungs are the organs more particularly exposed to its operation, indeed we may say exclusively so, a doubt can hardly arise upon the subject, especially as regards the lungs, and little objection, I think, can be made against the operation of the same influence on the skin—the experiments of Jurine, Spallanzany, and Abernethy having unquestionably proved, similarity of function—the imbibition of oxygen, and the exhalation of carbonic acid gas, by the capillaries exposed to aerial influence on both surfaces.—And the same is inferred by the experiments before quoted—the effects on the system being the same from sulphuretted hydrogen, whether inhaled, or left some time in contact with the sound skin.

It remains then but to determine, whether, this agency operates on the nerves, and capillaries exposed to its influence—in arresting their function; or whether, as a poisonous agent, it is imbibed, and received into the circulation. The latter, I think it will be acknowledged, the most reasonable conclusion; as it offers an explanation, why, diversity of effect, and variety in disease is induced—by variety, or difference in the composition of the mephitic vapour or malaria—and thus, fever is the product in one case, and cholera in another: this view meets too with support, by the experiments with the noxious gases upon animals, which are found to exercise beyond the exclusion of oxygen,

a positive noxious influence upon the system ; and this we find differing somewhat in effect, according to the particular gas which is employed, as is the case with the various other poisons, both of the animal and vegetable kingdom—effects that are presumed to take place from the absorption of these substances, and the blood's contamination. Indeed the office of the lungs, would appear quite of a passive character, in relation to the changes effected on the blood by respiration—the conversion of black into red blood, which is, the simple effect on the one hand, of the exhalation of the ready formed carbonic acid gas, which the experiments of Mr. Brande prove it to contain—from the ramifications of the pulmonary artery distributed over the air cells ; and on the other, of the imbibition of oxygen with the returning blood, by the pulmonary veins—which, being connected by their trunks, with the left auricle of the heart, is thus absorbed by its dilatation. That this is the principle absorbing power, is, I am of opinion, fairly made out by the experiments of Professor Mayer, he having proved, by injecting fluids through an opening into the trachæa, that absorption went on from the lungs, more powerfully than from any other part of the system ; which is, exactly what reasoning a priori would lead us to expect, with our knowledge of the fact, that the heart's sucking action or dilatation, is the principal absorbing power—Seeing how immediately these organs are under the operation of the heart's influence : and I think it extremely probable, that in the lungs' condensation, or a certain degree of compression of the air takes place, facilitating the process.

We are borne out in these views of the respiratory function, by analogy with both Spallanzany's and Abernethy's experiments on the skin; the first was completely satisfied, that air in contact with the skin is changed exactly in the same way as by respiration: when atmospheric air was employed, oxygen disappeared, and carbonic acid gas was produced. He was of opinion, the oxygen had no share in the immediate production of the carbonic acid gas, because it was equally great, when the animal was exposed to gases containing no oxygen; and he therefore concludes, that, the carbonic gas was exhaled, and the oxygen absorbed: and Mr. Abernethy's experiments warrant the same conclusions.

That any appreciable direct influence arising out of the inhalation of malaria, if it really exercised any on the nerves, the chemical it would appear being but secondarily subject to such influence, would be, on the mechanical function of respiration—which were it thus to operate, would give rise to symptoms so characteristic, that they could not have escaped notice.

That I believe we may safely conclude, that malaria is received into the system by absorption, and thence its influence is exerted: though I may add, when very virulent, it may simultaneously affect the capillary vessels exposed to its influence—whether cutaneous, or pulmonary, or both; but of this I shall speak hereafter.

Assuming then, that the noxious influence of malaria is induced by the blood's contamination, I shall, after a short digression I am constrained to make, in pursuance of the enquiry, trace its effects

on the system in giving rise to the symptoms of the disease.

It is an established fact in chemistry, that the decomposition of a compound, or the formation of a new one, is attended with an alteration in the electrical capacities of the products—the change manifesting, an increase or loss in this respect—it becoming either plus or minus, latent or evolved. Now as the process of accretion, assimilation, and secretion, constituting the change, or conversion of arterial into venous blood, at the termination of every arterial capillary of the system, is, a chemical process—this conversion, is not only attended with an evolution of caloric, but it will not be unfair to add—with electricity also; hence from the first, the body's temperature and its equal diffusion; and from the second, its nervous or electrical excitement or vitality. The former of which or caloric, is abstracted by the surrounding media from the superficies of the body; or is exhaled, in combination with the perspirable and bronchial secretions, from the skin and lungs. And the latter or electrical evolution, which I believe to be in a ratio with the calorific and chemical change that has taken place, having its source in the capillary circulation, explains the reason, why, vitality goes on in these vessels, for a considerable time after the apparent death of an animal; and the irritability of muscular fibre, after the appearances more particularly denoting life have ceased. And it explains also, the reason why, the arteries after death are found empty—capillary circulation still going on, as long as red blood is furnished by the arteries for their excitement.

Another argument that may be adduced, favoring this view of the body's electrical generation, is the known fact, that a capillary tube is quite impervious to the passage of a fluid—but under the excitement of electricity admits its passage freely : now, as the capillary vessels of the animal system are so minute, that they are not discernible by the naked eye, but by a powerful glass the free circulation of the blood is to be seen through them, we are warranted in our analogy in supposing they may be excited by the same means : as it has been proved by experiment, that it is no impulse from the heart, or action of the arteries, that carries on the circulation in these vessels, as it still goes on long after the heart has been removed from the body. And further it has been proved, that the excitement of these vessels is not derived from the brain and nerves, by removing both brain and spinal marrow ; and the same is inferred, by what we notice in palsy.

That there can be little doubt, of the origin of nervous or electrical fluid of the body, being in the way I have suggested. The electricity thus generated, I am of opinion, is transmitted by the most perfect conductors of the animal textures—the nerves, to their source, in the common acceptation of the word, and its receptacle—the brain and spinal marrow ; from whence, it is again transmitted by the nerves, at the pleasure of volition, in the several actions of muscular contraction ; excites the sensorium, to the various operations of the mind ; and the organs of sense to their respective functions ; or is transmitted, by the ~~par~~^{par} vag^æ to the great secretive processes of the stomach, and other

organs to which these nerves are transmitted—and hence the intimate connection, and remarkable sympathy, existing between the head and stomach, and the liver; and an explanation why, mental emotions so immediately derange digestion, and the functions of the several organs to which these nerves are transmitted. For further particulars and arguments in illustration, see Essay in the Appendix.

SECTION II.

DIGEST OF THE FOREGOING.—MODE OF ACTION OF THE VENOM OF THE SERPENT, AND OTHER POISONS OF THIS CLASS.—DARK COLOUR OF THE BLOOD IN THESE CASES, AND ITS CAUSE.—PECULIARITY OF THE PULMONARY CAPILLARIES.—ARREST OF THE RESPIRATORY FUNCTION, AND EFFECTS RESULTING FROM THE CIRCULATION OF BLACK BLOOD; AND EXPLANATION THEREOF.—THE PRIMARY OPERATION OF THE FEBRILE CAUSE, NOT ON THE BRAIN AND SPINAL MARROW.—COLD, ITS OPERATION ON THE SYSTEM—AS IN THE COLD BATH.—ITS MODE OF ACTION IN PRODUCING SYNOCHAL FEVER.—DIARRHÆA, EXPLANATION OF THE PHENOMENA AS AN EFFECT OF CAPILLARY TORPOR.—CONDITION OF ATMOSPHERE MOST FAVOURABLE TO BOWEL COMPLAINTS.—DIARRHÆA A FREQUENT PREMONITORY SYMPTOM OF CHOLERA.

From the previous considerations the following inferences are deduced. That the noxious influence of malaria, is induced by the blood's contamination,

and operates in torpifying or arresting, the chemical functions which take place in the general capillaries of the system—by which, there is a diminished evolution of caloric and electricity, and in consequence, debility of all the functions. And it is probable in the same way, the venom of the serpent, and the various other sedative poisons, both of the animal and vegetable kingdoms, induce their effects: for it has been observed by several persons, of cholera, “that there appeared a sudden depression of every vital energy, and those who died, had more the appearance of persons labouring under the bite, or sting of some poisonous reptile; or the effects of some narcotic poison, than from disease.”

I am supported too in the views I have advanced, by the experiments of Dr. John Davy; who found, that “the air expired from the lungs of the sick with cholera, did not contain, more than one-third of the carbonic acid gas contained in the breath of healthy people.” And further he observes, “In some cases the flaccidity of the muscular parts after death, resembled that produced in animals by electricity, or when hunted to death. The colour of the venous, and the arterial blood was the same, both being of the dark venous hue; a fact that I have myself witnessed, on taking blood from the temporal artery.

This blackness of the blood however, is an effect, I believe generally secondarily induced, and brought about in the same way, as it is when other of the same class of poisons have been received into the system—and is a consequence of general capillary torpor, and functional debility of the respiratory

organs, both in their mechanical and organic structure.

Though I admit, the same agency may not be without its direct influence, on the skin or lungs subjected to its operation, as the stomach and other parts are, to which other of this class of poisons may be applied. It is, however, not undeserving notice, that the pulmonary capillaries in which the changes are effected by respiration—at least the first series, contrary to those distributed on the skin, and the capillaries in general—are venous, and by consequence I should say, less irritable and susceptible of impressions of any kind; which would appear, another of the many wise provisions we see of the Almighty's, considering how important this function is, to the economy.

The cutaneous capillaries on the contrary, are, we know, highly susceptible to impressions of all kinds, it is therefore very probable, they may be thus simultaneously influenced, or rendered torpid by the agency of cold; and as their function is the excretion of the perspirable fluid, in conjunction with a large quantity of carbonic acid gas—considering the great extent of the cutaneous surface—the effects it may be supposed, would be proportionately increased: and thus would the operation of a less virulent cause than ordinarily gives rise to this disease produce the same result.

Another argument that may be adduced in favor of my views, is the fact before adverted to, that in animals killed by exposure to the noxious gases, as well as in persons who have died by the like or mephitic emanations, there has not only been this

blackness and fluidity of the blood noticed, but annihilation also of the contractility of the muscular fibre; both of which are noticed by Dr. Davy in the subjects of cholera,—the latter if not, however, so fully expressed, being fairly implied. The experiments of Bichat too on the respiratory function in animals, may be adduced as bearing on the subject; who concludes his numerous experiments by observing, “We conclude then in general terms, and without attempting to determine how this takes place, that the heart’s action ceases, when the chemical phenomena of the lungs are interrupted; because the black blood which penetrates its muscular fibres, is not capable of keeping up their action.” And the same he says of the brain, and finally observes; “The circulation of black blood carries to every part debility and death; the organs ceasing to act, because they receive no red blood.” I have only to add, how well do the views I have taken of the capillary circulation explain all this; and render it, I am of opinion apparent, that the primary operation of malaria, not only as a cause of cholera, but of fever, is not upon the brain and spinal marrow, as it has been supposed, and asserted by *Dr. Southwood Smith* in his late work on fever, but are effects secondarily induced, as I have already partially, and shall more particularly explain hereafter, with the majority of symptoms in common to the two affections, which I repeat, are but modifications of the same disease.

Having spoken of cold as an accessory cause of the disease, I wish to be more explicit with regard to the views I entertain of its operation on the system. In furtherance of this intention, I beg to be per-

mitted to offer the following explanation of diarrhœa; a very frequent cause of which, is said to be checked perspiration, by getting wet in the feet, or some partial exposure to wet and cold of this kind. The idea that generally prevails, with regard to the operation of this cause in inducing this complaint, is, the repulsion of the blood and excretion from the skin, to the bowels; this I believe to be true in point of fact, but not in the simple manner here implied, as no repulsion from without, could operate in this direct way, the circulation on the surface, holding no connection whatever with the bowels but through the intervention of the heart; and cold simply, acting on the surface, or rather I should say, the repulsion of blood therefrom producing a contrary effect; as we see exemplified in the operation of the cold bath—the capillaries in this case, being constricted, the blood is impelled in its return to the heart with greater vigour from the veins—at the same time, the blood in the arterial branches being restrained, produces distention of their trunks—and thence after the cessation of the cause (provided it is not carried to too great an extent) a more vigorous contraction, and by consequence, increased temperature and slight febrile excitation. Should exposure, however, to this agency have been carried beyond this point, and yet short of the powers of life having been too much subdued, by the abstraction of heat to the bringing about of reaction—congestion will take place, the seat of which will be the arteries, from the reasons already given—the left ventricle will be preternaturally distended, and excitement of the heart will ensue—and synochal fever be the con-

sequence, as is the case in what is called catching cold.

But the effects of wet and cold in inducing capillary torpor, appears of a very different character, in short, directly opposed to this, operating I am of opinion, in subduing the action of these vessels, by robbing them not only of their temperature, but also of their nervous excitement; by which, the chemical changes, they are destined to effect on the blood are arrested;* the effect of which, commensurate with the cause, is precisely the same in character, as impeding the respiratory function—defective excitement of the heart, and all the vital functions; and by consequence, abdominal venous congestion, and scrous exhalation from the bowels, as will be afterwards explained, and hence diarrhæa; and thus it is, I believe, this symptom so frequently precedes those, more particularly denoting an attack of cholera, in the milder visitations of the kind.

The state of atmosphere accompanying the operation of this cause, I believe to be of no mean importance in the account. A low barometer, with a non-electric, or negative state of the atmosphere, may materially predispose to the result; and hence it is, the attacks of cholera, both epidemic and sporadic, have been so much more frequent

* Extreme cold, however, probably induces the same effects, or nearly so. The irresistible propensity to sleep, which overtook the party accompanying Dr. Solander and Sir Joseph Banks, in their arctic expedition, is explicable in the same way; or perhaps in this case, by its simply constringing—and so closing the cutaneous and pulmonary apertures, there was a perfect arrest, or nearly so, of the exhalation of carbon, and sleep from its narcotic effects ensued.

during this, than any other state of the weather : so much so, that I had, as well as Mr. Orton, conceived the epidemic cause to have been—a negative or non-electric state of the atmosphere, in relation to which, the body I imagined held a positive state—abstracting this influence, and thus occasioning capillary torpor and its consequences.

CHAPTER VI.

THEORY OF THE DISEASE—OR EXPLANATION OF THE FOLLOWING SYMPTOMS.—PRÆCORDIAL OPPRESSION.—SERO-MUCOUS, OR CONJEE WATER-LIKE EVACUATIONS.—GIDDINESS, AND SENSE OF DEBILITY.—FEEBLENESS OF THE VOICE, AND DEAFNESS.—INDIGESTION AND VOMITING.—SUPPRESSION OF THE SECRETIONS OF BILE, URINE, ETC.—INFLAMMATION OF THE STOMACH AND BOWELS; WITH OBSERVATIONS ON THE ORIGIN AND FUNCTION OF THE SYMPATHETIC NERVE.—SPASMS, BOTH OF THE CLONIC AND TONIC KINDS.—OP-PRESSED BREATHING.—COMA AND DELIRIUM.—CEREBRAL EFFUSION.—COLD SWEAT.—APOPLEXY AND ITS PATHOLOGY, WITH REMARKS THEREON.—THEORY OF FEVER. ETC. ETC.

IF my views are correct as to the cause, and operation of that cause, the symptoms which ensue, are necessarily referrable to the defective excitement of the heart and brain, or principally so: these being the two principal organs, and on which, the functions of the others are dependent. The first I shall notice will be that of the heart, in a ratio with its defective power, in its two-fold capacity of a forcing and sucking-pump, which the experiments of Barry and Magendie warrant us in

the conclusion that it possesses—will accumulation of blood take place in the veins, which accumulation or congestion, will necessarily be to the greatest extent, at those points of the circulation the most remote from the heart's influence, which obtains, to by far the greatest extent, in the mesenteric, gastric, and splenic veins, forming the roots of the vena portarum—as the propelling action of the ventricle ceases in the arteries, and the sucking power of the auricles dilatation has to operate, through the additional and protracted route, both of the hepatic veins, and vena portarum—hence the distention of the mesenteric and gastric veins, and sense of præcordial oppression—the first symptom, when I was the subject of the attack that I was sensible of.*

Further, as it has been proved by the experiments of Home, Magendie, and others, that these vessels in health absorb fluids from the stomach and bowels, and which it may be presumed is effected by the heart's sucking agency, it is fair to suppose—the permeability of these vessels which admit of absorption in health, under their present state of engorgement, and condition—in which the sucking agency is withdrawn, or rendered almost nugatory would admit of exudation; † and hence

* I mention this, as I must repeat, it was strict attention to the progression of the symptoms and my feelings under personal experience, which led me to the explanation I now offer.

† To those who object to this explanation founded on the heart's sucking action, or dilatation and atmospheric pressure, I have only to say, that arrest of the functions simply, and circulation through the capillaries, explains the phenomena nearly as well; as will readily present itself to the reader, on considering the function we have assigned them, and the passage of fluids through capillary tubes.

the sero-mucous or conjee-water-like evacuations, either from the stomach or bowels, or both; but particularly from the latter, as the natural exit of the contents of the former is through them.

That sickness, or vomiting in the early stage I think rather attributable to the stomach's defective nervous excitement, from diminished energy of the brain, as we see so often exemplified in cases of debility, on the patient's removal from the recumbent to the erect position, and particularly from the sudden loss of blood—the patient becoming giddy and sick, from defective arterial distention and excitement of the brain. And this explains the giddiness and sense of weakness, that so generally attends an attack of cholera, and has been so frequently complained of, as the first symptom the patient was sensible of, or noticed.

Feebleness of the voice, and deafness also are referrible to the same cause. It may be observed too, that from the cause before noticed giving occasion to vomiting, will symptoms of indigestion ensue, and hence the undigested rice and other alimentary matters so frequently ejected. I particularly mention rice, as it led some to an inference, that it was a diseased state of the rice crops which gave rise to the malady.

In a ratio with the defective excitement of the heart and brain, will be that of the glandular system, hence the diminution or suppression of the secretions of bile, urine, &c.

Inflammation and spasm come next to be considered, and are as readily accounted for, by pursuing the same chain of reasoning, adding to the consideration, difference of temperament, idiosyn-

cracy, state of the individual at the time of attack, a greater or less intensity of the cause, and treatment pursued. Thus I should say, if the exudation from the mesenteric and gastric vessels does not take place, or is not equal to the relief of the distended veins, free ingress of blood is not admitted from the capillary arteries, and the consequence is, they become irritated by distention and excited into inflammatory action, and hence the sense of burning heat, pain, extreme restlessness, and irritability of stomach, desire for cold water, and symptoms specifically denoting inflammation of the stomach and bowels.

Such symptoms, it is obvious, are more likely to attack the European than the native; the free liver, and those of inflammatory susceptibility of system: and it is fair to suppose, may have been induced in many others by heating inflammatory remedies. It is worthy of notice, that these organs, being primary in the scale of animal existence, derive their nervous influence principally from the sympathetic, which originates in twigs, given off by every collecting nerve proceeding to the spine and brain—that they may be but little influenced by causes operating on the latter; (see Essay in the appendix): hence it is, the stomach and bowels retain their irritability to the latest period of existence, even after the apparent vitality of every other organ has long ceased; and from which it may be inferred, that these organs would be proportionably more susceptible of inflammatory excitement, than any others; and hence it is in this disease, the leading character of which, may be said to be the very reverse of inflammatory, that these

organs, have been found almost exclusively the seat of inflammation.

Spasms come next to be considered, they are for the most part of the clonic kind, or primarily so in all cases, dependent I believe on congestion in the spine, at the origin of the affected nerves; and the tonic kind, to which the European is more frequently the subject, dependent on the same cause as the former, but having developed a certain degree of inflammation in the part: for Dr. Saunders, in a letter to Dr. Dunnean, published in the 64th No. of the Edinburgh Medical and Physical Journal, observes, "If any muscle, voluntary or involuntary is affected with spasm, and during the affection the person dies, on examination it is found, that the nerves which supplied the spasmed muscles are covered with turgid red vessels at their visible origins:" he goes on to observe, "In short the nerves exhibiting such turgescence at their origins, correspond in number and situation with the muscles which exhibited inordinate contraction. I have conducted the investigation for about sixteen years, and have not found one exception." This conclusion is confirmed by my own observations in Tetanus, and recorded long ere I saw this letter of Dr. Saunders's; two patients dying from this disease I examined, and found in both, the most unequivocal marks of inflammation in the spine and at the base of the brain, whence the nerves originated which supplied the spasmed muscles: it is an observation now indeed of every day occurrence.

Slow, or oppressed breathing, which have been noticed in the advanced stages of the disease more particularly, necessarily result from defective ex-

citement of the respiratory muscles on the one hand, and of pulmonary congestion on the other.

Coma, from congestion of the brain ; and delirium when it occurs, indicates the development of inflammation of the same. The congestion of the brain, it may be observed is likely to become considerable, from the circumstance of its unyielding bony case not admitting its vessels to be influenced *ab externo* by the pressure of the atmosphere, and the same obtains in the spine. The serous effusion which has been so frequently noticed on dissection of the brain, is explicable in the same way as the exudations are from the stomach and bowels, or from the skin, which latter as cold sweat we shall next consider.

The experiments of Dr. Barry, exhibited to the French Institute, of arresting the absorption of poisons from the surface, by the application of exhausted glasses, would seem to prove, the heart's sucking action to be the principal agent of absorption from the skin also ; and the experiments of Majendie would appear to place this beyond a doubt, and establish that the veins, are the principal imbibing vessels. Cold sweat may be considered, therefore, an exudation from these vessels, and evince, if not of a transitory nature, from some sudden cause of exhaustion, a still further depreciation of the heart's action—bordering, we may suppose, on its final extinction ; hence it is, so generally a fatal symptom, not only in this, but in most diseases.

Having completed an explanation, which appears to me satisfactory, of the whole phenomena of the disease, I have, in conclusion of the subject, but to

ask—are not those sudden and concentrated attacks, which destroy the patient, without the development of the usual and more characteristic symptoms of the disease—like a resistless apoplexy, resulting, from the overwhelming congestion of the brain—annihilating its functions and all the powers? Dr. Johnson mentioning in his valuable work on the Diseases of Tropical Climates. “Mr. Finlayson observed in some cases, which happened often in Bengal, that the operation of the morbid cause was so violent as to destroy life in a few hours, without any other characteristic tokens of the disease, except the extreme prostration of strength. In these particular cases there was such congestion of blood in the brain, that it had the appearance of being enveloped in a layer of dark coagulated blood, or by a diffuse and general ecchymosis, and in some cases where it was cut into, large quantities of dark coagulated blood gushed from it, and from the theca of the spine. In the ordinary form of the disease, this appearance was wanting, the blood being principally collected in the abdominal viscera.” And the same work mentions, that it was an observation of the Bombay Medical Board, “That those who are most intimate with the disease in question, will be struck with the great similarity between this and the congestive typhus of Armstrong. And dissections, they state, abundantly prove that venous congestion constitutes the principle change that takes place during life.”

Having represented the connexion as most intimate between cholera and fever, it may be necessary that I say a few words, on their distinctive characters. The former I have represented as a dis-

ease, marked by the subduction of power, or in which, symptoms of excitement are but seldom evinced, beyond what are resulting from topical inflammation : whereas, the characteristics of fever in general* may be said to be the reverse of this—increased action and general excitement ; the way in which this is brought about in the typhoidal order, I believe to be somewhat analogous to that by which I have represented cold to have operated, in the production of synochal fever : the depressing cause being of less virulent character than in cholera—operating but to the extent of producing that degree of congestion which little interferes with the due function of the brain—and but of resistance, to free ingress from the arteries—that distention in their trunks, and excitement ensues. To which we may add, that in proportion to the severity of the cause, and susceptibility and so forth of the patient, will topical engorgements and inflammation be concomitant ; which inflammation will be seated in those parts, from reasons already enumerated and assigned to them in cholera—which being in the stomach and bowels more particularly, and the

* In speaking of fever in conjunction with cholera, I have under consideration exclusively the typhoidal forms—the essential cause of which I assume to be, of sedative operation ; in opposition to the synochal, which originate in causes of an opposite character. In making this remark, it will be necessary that I observe, that in the illustration I have given, of the operation of cold, which may be considered a sedative agent, in the development of this form of fever—that it is but of local operation, the blood remaining uncontaminated—and in consequence, the capillaries in general, remaining highly susceptible of excitement.—In concluding this note I must observe, the class *Pyrexiaë* is clearly divisible into two orders—the synochal and typhoidal—each requiring its distinct mode of treatment, and which it would be well to consider in our practice in either.

head—explains how both Clutterbuck and Broussais were individually led to the mistake, of assigning to these organs the exclusive seat of fever.

We have analogical illustration of this cause of excitement, in the operation of other sedative agents on the system—opium may be mentioned, small doses producing primarily a certain degree of excitement; whereas, a large one, induces an opposite effect, at least the excitement is so transitory, that it cannot be calculated upon—and this is followed, by overwhelming cerebral congestion.

CHAPTER VII.

DIVISION OF THE DISEASE INTO THREE SPECIES OR VARIETIES ; ENUMERATION OF SYMPTOMS, DIVISION INTO STAGES, AND INDICATIONS POINTED OUT TO BE FULFILLED IN THE TREATMENT OF EACH ; TERMINATING WITH SOME IMPORTANT PRACTICAL REMARKS.

FROM the explanation of the symptoms of the disease, the principles may be readily deduced, which should govern us in the treatment: but before entering into the subject, I beg to be permitted, to divide the disease into three species or varieties; which will bring the symptoms again under view, which perhaps is necessary, before entering upon their treatment.—The first species, characterised by the severer grade of affection, I shall, with Mr. Scot, call—Cholera Asphyxia.—The second, presenting the common and most usual phenomena—Cholera Congestiva, as I have before taken the liberty of denominating it. The third species, in which symptoms of general excitement become developed, there will be no impropriety in classing with Cholera Morbus of nosological writers, to which it is allied, both in character and treatment.

I have only to add, that the distinctions here made, although not without use, will not often be found so well defined in practice; as the species

not only run into each other by insensible gradations, but are variously modified, by constitutional idiosyncrasy, temperament, and habits of the patient; and by numerous other circumstances of a local character—for after all, they are but one and the same disease, modified by these circumstances and a greater or less intensity of the morbid influence.

CHOLERA ASPHYXIA, is, as Mr. Scot observes, “noted by the very slight commotion in the system.”—The sensorium is in an instant invaded by vertigo, ringing in the ears; with deafness, and dimness of sight. The contents of the bowels much diluted are at once discharged, after which the white stools come on, characteristic of the disease, and occasionally vomiting—but they soon terminate—a mortal coldness, extreme prostration of strength, with arrest of the circulation come on from the beginning; and death follows, perhaps in half an hour, without a struggle: though occasionally, convulsions have been noticed.

CHOLERA CONGESTIVA.—The patient is usually suddenly seized with giddiness, borborygma, and purging; or the latter, with a sense of weakness and symptoms of indigestion have been for some hours, or even days duration; these are followed by vomiting, which, with the evacuations from the bowels, soon assume the congee or barley water appearance—succeeded by great prostration of strength, tremor or twitching of the ex-

tremities—alias clonic spasms; a sunken ghastly countenance, ringing noise in the ears, cold damp skin, feeble pulse, and sense of præcordial oppression. From the sense of præcordial oppression heat sooner or later becomes developed, and the patient complains of inward burning, attended with great thirst, and insatiable desire for cold water; the irritability of the stomach is now usually increased, and there is extreme restlessness. The pulse becomes now sharp, frequent, and wiry, while the extremities are cold, and in general damp: with the development of this partial excitement, tonic spasm or cramps usually set in, commencing in the feet and legs, and gradually increasing, are extended to the upper extremities, and occasionally involves the muscles also of the belly and chest. The exhausting influence of these spasms, or sense of internal anguish, singly or conjointly, is soon succeeded by collapse; the stomach and bowels which continued before irritable, now retain whatever is poured into them; the spasms cease, the skin is livid, covered with cold sweat, and the fingers shrivelled; the eyes are suffused with blood, or covered with a dense film, half open, inanimate, and countenance death-like; coma and dyspnœa ensue, and life gradually leaves its frail tenement without a struggle.

CHOLERA MORBUS.—The disease here so designated, generally comes on with cold chills, languor, muscular pains, and sense of numbness in

the extremities, giddiness or weight in the head, nausea, fullness at the præcordia and symptoms such as in general precede an attack of fever; then follow vomiting of slimy or bilious matter, and purging of the same description, attended with griping and pain in the bowels, heat of skin, full or strong pulse; rending head-ache, and severe spasms, attended with excruciating pain.—If this stage is not promptly subdued, it progressively or suddenly lapses, into the collapse of the former variety.—

“Nothing, perhaps, can be of more practicable consequence, than to note accurately the various stages of acute diseases, from their commencement to their termination; for unless this be done, the disputes may be endless about the modes of treatment, which must correspond to the leading phenomena of each stage.” This erudite and just observation of Dr. Armstrong’s, is particularly applicable to the disease under consideration, and it has been the want of its observance, that has principally occasioned, the discrepancies that at present prevail in practice; and has given foundation for the vaunting of such an incongruous diversity of specifics, of characters the most opposite. I shall therefore offer a few observations on this head, although they hardly can have escaped the notice of the reader.—Each species is made up of an assemblage of the three following stages; excepting the first, which appears to be but of one, overwhelming the system at a blow.—The 1st stage, of Torpor or

Oppression—the 2nd, of General or Partial Excitement—and the 3rd, of Collapse.

The 1st variety of the disease, or Asphyxia species, would appear a simple and concentrated act of oppression, perfectly apoplectic.

The 2nd species, or Congestive—combining the whole.—In the first instance oppression, bounded by the tonic spasms, and other symptoms, denoting the partial or topical excitement of the second stage; which terminating in the last of collapse—is evinced by the spontaneous cessation of the vomiting, purging and spasms; accompanied with the loss of pulse, and profuse cold sweat.

The 3rd, or Cholera Morbus—partakes of the first stage of oppression in a slighter degree—the second of excitement being its more obvious, and principal characteristic,—but the supervention of the third stage is to be borne in mind, as an occasional consequence.

The indications of treatment resulting from thus viewing the disease, are obvious—to remove the first stage of oppression, which our explanation attributes, both to suppression of power and venous congestion,—by remedies both stimulant and evacuating; then follows on its supervention—the moderating or removing, the second of excitement, by remedies more particularly evacuating, bearing in mind at the same time the nature of the disease, that the powers of life may not be by the means

employed in this—fatally subdued—in the event of the third, of collapse ensuing: in which stage, the indications are, to allay irritation, restrain every debilitating evacuation, to restore the natural secretions—and at the same time, to husband and support the remaining feeble powers of existence.

Before entering into the means of accomplishing these purposes, I have a few preliminary remarks to make, which cannot be too strictly attended to; one is, that on the first evidence of the disease, and throughout its duration, the patient be strictly kept in the recumbent posture; contrivances should therefore be adopted, to preclude the necessity of the patient being moved, for any of the purposes of evacuation, they may be received both from the stomach and bowels in a bed-pan, or be absorbed in a cloth—and whatever it may be necessary to administer, should be while the patient remains in the same recumbent state; this cannot be too strictly enforced—as the following will prove, two patients having under my own immediate care lost their lives, from neglect in this particular: the first I was supporting in my arms and administering to him some warm soup; syncope at the time he was drinking it, ensued, and although I immediately laid him down, poured within a minute some æther into his mouth, and adopted every other expedient that would suggest itself in such a case, it was all to no purpose, the spark of life could not be recalled. The other patient was a Sepoy, who had completely got the better of the attack, and who felt so well, that he got up with the intention of relieving his bowels outside the hospital, at least so I was told, but before he reached the door he fell down faint,

and as the Dresser was not at hand, he died before assistance could be afforded. This will be a very suitable place for me to make another observation, and which I cannot do better than in the words of a very intelligent friend, "Our trepidation, too often leads to error, changes that can only happen, after sometime has elapsed,—and slowly—are looked for with impatience,—and if not occurring *horæ momento*, medicines to produce them are repeated in excessive doses ; in short, until they aid—instead of opposing the disease. I am sure this anxious unprofessional impatience, has too much prevailed amongst us since 1817, when the cholera first alarmed us—in a word, we act from fear—and not from judgment." I shall conclude these observations by another very just one of Dr. Armstrong's, who observes, "one part of the practice of physic in acute diseases, especially in fevers, consists, in the decisive employment of active agents in the beginning ; another part is, to select and apply intermediate means in the intermediate stages, that a due relation between the treatment, and the disease may still be observed ; and the third part is, either to forbear altogether, or do little in the very last stage, in which powerful measures are generally the most destructive which can be used."

CHAPTER VIII.

SECTION I.

A SUMMARY OR GENERAL OUTLINE OF THE TREATMENT TO BE PURSUED IN EACH STAGE OF THE DISEASE ; WITH OBSERVATIONS ON THE PRINCIPAL REMEDIES.—STIMULANTS—MERCURY—BLEEDING—PURGING, ETC. ETC.

THE laws of nature and of living matter being immutable, it is only to understand aright, the operation of diseased action, and the same of our remedies, to enable us to lay down determinate rules of treatment ; and as there are many roads to the same place, though but one that is strait, so there may be many ways of treating a disease successfully, though, perhaps, but one that is really essential and that can be assuredly depended upon ; and this, we hope, we may be enabled to define.

The immediate cause of the disease, being, I must repeat, torpor of the general capillaries of the system, by which the chemical changes in the blood are but imperfectly effected, and as a consequence, of diminished evolution of vital temperature and nervous energy—there becomes, debility of all the functions, and hence the congestions—and stage of oppression that ensues, the primary indication of

treatment, is obviously the restoration of excitement to these vessels, on which the whole phenomena of the disease depends : to accomplish which, stimulants are expressly indicated, and of chief among their number might perhaps be mentioned, the inhalation of oxygen gas ; but as this is a remedy so seldom available, it is well we have another that is always so, whose operation I believe to be specific on these vessels—this is mercury : for of this remedy, I expressed my opinion some years ago, to the following effect, which every day's experience confirms me in the belief, is a most just one—"The effects of this remedy being so multifarious in the cure of disease, its operation must be very general on the system, its primary action, I believe to be specific on the capillary vessels, exciting them to increased action ; hence its renowned deobstruent powers, and its operation on the glandular system—in increasing the various secretions : its more obvious effect on the hepatic function, is probably owing to its primary direct influence on this organ, by its absorption from the stomach and bowels—by the veins from these parts, forming the roots of the vena portarum. Its operation in exciting the capillary vessels, necessarily removes congestion from their venous roots, and obstruction from the exhalants, hence its accredited action on the absorbents—in removing the various serous exudations. Its power of increasing vascular action is further evinced, by the febrile commotion it excites in the system, and the buffed blood of those under its influence : effects however, where they occur, that I am of opinion evince its contra-

indication in practice.”* In thus viewing its operation, its employment in cholera would appear in various points of view, we might almost say specific in the cure of the disease, and which I believe it to be—aided, of course, by such remedies as circumstances require to further its action; and in the removal of symptoms—as effects, arising out of the continuance of the disease; with the first of these intentions, both local and general of the more ordinary stimuli are indicated, such as external heat and friction, aided by the recumbent posture; and of internal administration, ammonia, warm spirits and water, and the like.—And with the second intention, stimulating saline clysters, with the view of increasing serous exudation, and by consequence, removal of congestion—from the mesenteric and gastric vessels, as well as from the brain—and thus aiding absorption of our remedies from the stomach and bowels. The experiments, I believe it was of Magendie, having proved, that absorption from all the surfaces, went on in the inverse ratio with vascular distention; and they may be resorted to with the further intention of tranquillizing the stomach. With the same intentions, added to some others, blood-letting be-

* Mr. Lawrence, in a late lecture on Syphilis, published in the *Lancet*, observes of mercury, “It produces very considerable and powerful effects on the animal economy. It generally increases the quickness of the pulse, and sometimes produces, a slight degree of what we call, feverish excitement; it augments some of the secretions, particularly those of the salivary glands.”

May not the venereal poison, operate in some way analagous to the sedative poisons I have mentioned; and thus it is, this remedy proves so highly curative.

comes a remedy of great importance, it would appear by the removal of oppression from the capillary vessels, to afford direct aid in their excitement, or necessarily to increase the circulation through them—as verified in daily experience, the blood flowing in common phlebotomy becoming after a certain loss, of a brighter colour ; which can only happen, from the removal of resistance from the veins, to its ingress from the arteries. It is hardly necessary to add, the more obvious indications for blood-letting in the second stage of the disease. It must, however, in the employment of this remedy, be carefully borne in mind, that one of the essentials to the heart's action, would appear to be a certain degree of distention ; that in a disease like the present, after having operated a certain interval of time, from the congestions that ensue—there remains but little blood circulating through the heart, hence the small weak pulse, which clearly prohibits its use, as I know by fatal experience.—That it is an object with Europeans in general I am of opinion, and the more robust among the natives of India, wherever there is no absolute prohibition to its employment—to practice it at the earliest stage of the disease, whilst the pulse admits of it ; as it is a remedy early resorted to, that general experience bears most ample testimony in favour of : and which is most obviously indicated, with the intentions I have specified : but in saying thus much in its favor, I must add, my most solemn protest, not only against its indiscriminate employment, but in any one case—usque ad deliquum, which has been the advice of some—or to an extent bordering thereon, for it is not in subduing—but with the intent of ex-

citing the heart's action, that we resort to it in the early treatment of this disease; that to adopt it successfully, we should draw it from a small orifice, the patient being in a recumbent posture, at the same time with our finger on the pulse, that its effects may be *carefully* watched, carrying it to an extent limited alone—by the constitution of the patient on *rising* of the pulse under its loss,* or *arresting* it should the pulse *flag* under the operation; though after an interval, on the pulse's restoration, it may be, where the symptoms of oppression still indicate its necessity, again resorted to—under the same restrictions, with the happiest effect. See Case in the Appendix A.

If proper measures have been pursued in the first stage, there will be little to apprehend on the development of the second, or stage of excitement, beyond ordinary symptoms of febrile commotion—which to a certain extent, is common I believe in every case, proving its origin, in common, and connexion with the fevers of this class; but where it is otherwise, the patient not having come sufficiently early under our treatment, and symptoms of partial excitement ensue, evinced by tonic spasms, sense of inward burning, pain, great irritability of stomach, extreme thirst, desire for cold water, restlessness or delirium; these symptoms, originating in topical engorgement, clearly point out, the indications to

* Cases of apoplexy, I do believe, are more frequently dependent on some depressing cause on the primary source of functional excitement, than is imagined; indicating the same plan of treatment here enjoined, particularly with regard to the practising of blood-letting: and I am of opinion the same views should be held in the treatment of snake-bites; patients under the influence of opium, and other narcotic poisons.

be pursued ; viz. bleeding, purging, and calomel, to which we may add, clysters, leeching over the seat of affection, and sinipisms or blisters as derivatives to the extremities.

The debility that ensues after an attack of cholera, is often very great ; this, with the nature of the disease, should be attentively borne in mind, that it may have due weight with us, in the measures we pursue throughout the disease, but more particularly so in the treatment of the second stage, when bleeding and purging may be resorted to, in relief of symptoms of general excitement, which we should rather moderate than subdue ; being now satisfied, that I have often myself done harm for want of sufficient attention to this particular ; indeed, from notieing how protracted the convalescence generally was, and by the consideration of how intimate the connexion, between this disease and fevers of the intermittent and typhoidal order,—I was led, in the last case I had the care of, to follow up the treatment on the moderating of this, the second stage of excitement—with bark and port wine ; a practice which my experience in this disease does not warrant me in enforcing, but which analogy would strongly suggest to us.* See Case

* By the success which attends it in the treatment of the intermittent and remittent forms of fever, and therefore I should say, the typhoidal forms of fever in general ; for my experience in the former, which has been great, having been Garrison Surgeon of Seringapatam during four years—where these diseases reign most triumphant—as verified by the fact, that I am the only surviving officer of five, who were with myself on the Staff of the Garrison, as well as that my predecessor and successor—with his wife, have all fallen victims to the place ; one on the spot, of cholera, the other two since leaving it, in consequence of fever—leads me to say, is truly indispensable, and I cannot help therefore

in the Appendix B. In delicate habits, or such in which excitement becomes but imperfectly developed, with them at all events, it is assuredly indicated.

The stage of collapse, if the patient has been timously seen, and the proper treatment pursued, I should say can never happen; but when it is otherwise, it is in such cases, a little opium may become a useful auxiliary in our treatment; but as I protest against its use in the other stages, in which, from a mistaken view of the disease, it has been almost of universal adoption, I have thought it necessary, to enter somewhat largely into the operation of this remedy on the system, making it a distinct subject of enquiry in the following section; that I shall leave, what I have to add on this stage, to the termination of this enquiry, annexing it to the succeeding chapter.

thinking, might be much more frequently resorted to in the treatment of fevers in this country than is now the practice. Such is my impression from reading the cases recorded in the valuable works both of Drs. Smith and Tweedie,—to whom, I would take the liberty of suggesting it; for many have I seen rescued from the jaws of death by the judicious employment of quinine, during the but imperfect apyrexia, who would have certainly fallen victims to measures of depletion which might have appeared necessary during the paroxysm: fever and inflammation are in these cases combined, to which cause it is, the remissions are so imperfect; that to treat them successfully a combined practice is necessary, requiring great judgment, and unwearied attention to the particular circumstances of each patient.

SECTION II.

AN ENQUIRY INTO THE OPERATION OF OPIUM ON THE SYSTEM; THE INDICATIONS FOR ITS EMPLOYMENT IN DISEASE IN GENERAL, AND IN CHOLERA IN PARTICULAR : WITH REMARKS.

As theory and successful practice, both operate in my mind against what I believe to have been too common, the exhibition of opium in this disease ; I beg first to consider, what the operation of this remedy is, on the system, both in health and disease ; and then propose the enquiry, what are the indications for its employment in general, and in cholera in particular, or on what grounds can it be recommended in this disease ?—Dr. Duncan, a physician of eminent talents, and one of the best writers we have on the *Materia Medica*, observes, of the action of opium,—“ Some have asserted that it is a direct sedative, and that it produces no stimulating effect whatever ; while others have asserted as strongly, that it is a powerful and highly diffusible stimulus ; and that the sedative effects which it undeniably produces, are merely the consequence of the previous excitement. The truth appears to be, that opium is capable of producing a certain degree of excitement, while the sedative effects which always succeed are incomparably greater, than could have been produced, by the preceding excitement. The stimulant effects are most apparent, from small doses—they increase the energy of the

mind, the frequency of the pulse, and the heat of the body; excite thirst, render the mouth dry and parched, and diminish all the secretions and excretions; except the cuticular which they increase: these effects, are succeeded by languor and lassitude; in larger doses the stimulant effects are not so apparent—but the excitability of the system is remarkably diminished; and confusion of head, vertigo, and sleep are produced. In excessive doses, it proves a violent narcotic poison, producing headache, vertigo, delirium, and convulsions; accompanied with a very slow pulse, stertorous breathing, and a remarkable degree of insensibility and stupor; terminated by apoplectic death: there have been instances of four grains proving fatal to adults. It is contra-indicated, in *gastric affections*, and determinations of blood to *particular viscera*. The administration of opium to the unaccustomed is sometimes very difficult, the requisite quantity being wonderfully different, in different persons, and in different states of the same persons; a quarter of a grain will in one adult produce effects which ten times the quantity will not do in another; and a dose that might prove *fatal in cholera*, would not be perceptible in many cases of tetanus: with some constitutions it does not agree in any dose or form. Its *stimulant effects* are most certainly produced, by the repetition of *small doses*; its anodyne, by giving a full dose at once; in some it seems not to have its proper effects till after a considerable time: the operation of a moderate dose, is supposed to last in general about eight hours from the time of taking it."

Dr. Duncan also observes, that "it is found use-

ful in excessive flooding;" and Dr. Hamilton, in pointing out its effects in supporting the powers of life, under the exhaustion brought on by this cause or profuse uterine hæmorrhage, and the immense doses that may be given under these circumstances, was led to deduce the inference, (which has since been proved to be correct in practice) "that, vice versa, blood-letting would modify the effects arising from an immoderate dose of opium."

The subjoined cases of poisoning by laudanum successfully treated by bleeding. Extracted from the Edinburgh Medical and Physical Journal of April 1821. I beg to annex in illustration.—"An unfortunate female, when in a carriage with a friend, swallowed an ounce of laudanum. The action was observed, and she was conveyed by her terrified companion, in about half an hour afterwards to the door of the practitioner under whom the author then studied. She was taken out in a state nearly insensible. Ten grains of vitriolated zinc were instantly administered, without effect; ten more were added in a few minutes afterwards, and other means were in vain resorted to, to excite the action of vomiting. As the comatose symptoms continued evidently to increase, a vein was opened, and nearly twenty ounces of blood taken away; sense and motion immediately began to return, the emetic action of the zinc was produced, and the patient was left in a short time afterwards, with no other remaining symptom of the danger she had escaped, than a little languor."

The author then gives another case, of a very delicate woman, who had taken but three drams of laudanum, in divided doses during the night; and

whom he visited at 2 p. m. on the following day. "I found her comatose, her breathing slightly stertorous; and seeing that she was not at all roused, by the exhibition of a dose of aromatic spirits of ammonia which I gave her, (she had been freely vomited during the morning, by the exhibition of the sulphate of zinc, and with great temporary benefit,) I poured some of the spirit of ammonia into the nostril, which produced sneezing, and a temporary amendment; so that, on being interrogated, she indicated that she felt great heaviness in her head, and vertigo; but, when we attempted to make her walk, her limbs failed under her. The coma now appeared every minute to increase, the breathing too became more and more stertorous; she was supported in a chair, her arms hanging down like those of a dead person; when spoken to no answer was returned; and when pinched, she did not appear to have any sensation. I tied up her arm, and took away fourteen ounces of blood, by which she was immediately relieved; so much so, that before the stream of blood was stopped, she opened her eyes, and answered that she felt her head very much relieved from the heaviness, and giddiness. After this, she continued gradually to improve—I directed an active purgative, and next day she had no complaint, except slight headache."

In short I am perfectly justified in asserting, the indications for the employment of opium, are exactly in the inverse ratio with the necessity for depletion, and other evacuants. Stupor, and insensibility, are the almost immediate effects of taking a large dose, as the numerous cases on record of

poisoning by this drug fully prove ; that its positive sedative agency is beyond all controversy, but in small doses, this effect, is preceded by a slight and transitory excitement, is what every man's experience in its employment, must have rendered apparent. Admitting this to be its operation, and what I have before mentioned, the indications for its employment, what are the circumstances indicating its use in cholera?—setting aside Dr. Duncan's positive declaration, that it is contraindicated in *gastric affections*, and determinations of blood to *particular viscera*—I can see but one, and that is in the last stage, or collapse ; to allay irritation, and arrest any inordinate discharge, and by these means, to aid in the support of the living powers ; now to accomplish these purposes, the dose is obviously small, and frequently repeated ; and even with these intentions, of every doubtful character, without the nicest management in its employment, in so delicate a state of the patient. The intentions with which it has been so generally recommended, I know full well, to have been stimulant and antispasmodic, and to restrain the action of the stomach and bowels ; but if the explanation I have offered, regarding these symptoms, has a particle of truth in it, it is very clear, we have been doing exceedingly wrong in attempting, by the agency of this remedy : as these are but the natural, and I believe I might with justice add, curative efforts of the constitution :—and is it not truly wonderful, that we should have been so long blinded to this system, it being of general remark, that the malignancy of the disease, is in proportion to the absence of these symptoms, and which it is

obvious the chief point of practice hitherto adopted has been to suppress !

Many there are, doubtless, who have recovered from the disease, to whom this remedy has been given, and that even in doses extraordinarily large ; but the same may with equal truth be said of numerous other remedies, in character the most opposite ; we may instance—emetics, bleeding, castor oil, milk and magnesia, and such like—in proof of which, see the cases narrated in the Appendix.

CHAPTER IX.

DETAILED TREATMENT OF CHOLERA IN ALL ITS STAGES, AND DIFFERENT VARIETIES; WRITTEN IN A STYLE ADAPTED FOR NON-PROFESSIONAL READERS, FOR THE ADVANTAGE OF THOSE MORE PARTICULARLY, WHO ARE BEYOND THE SPHERE OF MEDICAL ASSISTANCE.*

THE patient, on the first symptom of affection, to be confined to the recumbent posture, in short be laid in bed, between a pair of warm blankets, in an open airy room—when, should there be symptoms of indigestion, or the stomach appear oppressed, it will be advisable to evacuate it, by the patient either drinking plentifully of warm water, or by what is better—a mustard emetic, which operates as a powerful and general stimulant on the system: two tablespoonsful of the flour of mustard, or the same quantity of the powder, of the common black mustard seed, (which is to be procured in every bazaar in India, and which I found to be decidedly more active than the Europe flour) given in half a pint of pretty warm water, operates effectually in a few minutes,† without inducing any subsequent

* Alluding to persons who are travelling, and many others necessarily so circumstanced in India: as well as for the instruction of dressers, and other subordinate medical attendants, to whom the charge of troops on detachment and others, are often confided.

† This is an excellent dog medicine, a spoonful operates upon their bowels effectually in a few minutes.

feelings of exhaustion; on the contrary, the eyes sparkle, and a genial glow of warmth succeeds throughout the system, with proportionate increased vigour of the circulation.

After the operation of this, rather preparative measure—to the stomach's being placed in the best condition, to be acted upon by our remedies more particularly curative,—and in furtherance of the same, a warm clyster should be administered, consisting of a dessert spoonful of table-salt dissolved in a pint of warmwater, and a spoonful of common, or castor oil; and the same should be repeated every half hour, or oftener—for by thus keeping the bowels excited, tranquillity of the stomach is insured, and the consequent retention of our remedies—the chief of which, is calomel; but as this requires some time before it can be received into the system, and effect its operation—as the absorbing power of the stomach, or susceptibility to its influence—in this disease, the distinguishing character of which, being, the subduction of all the powers of life—is greatly diminished, it becomes necessary to give it in proportionately large doses, and at the same time, in aid of its operation, and in support of the living powers—to administer occasional cordials. A scruple of calomel in powder should therefore be placed upon the tongue, and the patient gargling his mouth with a little brandy and water, should swallow it; but it must be observed, the quantity of the latter should at no time exceed three table-spoonsful, which may be in the proportion of one of spirit, to two of hot water,—as a bulk of any fluid, in a delicate irritable state of the stomach, is invariably productive of its rejection.

If the case is urgent, the same dose of calomel may be repeated every hour; otherwise, in two hours; or if the patient is much improved, in half the quantity; and thus prolonging the interval, or reducing the quantity—it must be continued, according to the state of the patient, till bilious stools and urine are produced;—the spirit and water, or mulled wine, either; or where the system is very low, thirty drops of (sal volatile) aromatic spirits of ammonia, or of hartshorn in half a wine-glassful of water, may be singly, or alternately administered, every quarter or half hour; with the precaution before given, to avoid oppressing the stomach by undue quantity.

In addition to these means, if the skin is cold, warm flannels should be constantly applied; or if the skin is damp and the patient suffers by cramps in his legs and arms, the parts may be well compressed, and rubbed with the flannels besprinkled with hot salt. We have yet omitted to mention a very important remedy, one capable of producing much good, or no less harm—this is blood-letting—which if the patient is an European, or native of pretty robust habit, should be early resorted to—if the pulse admits of it, that is, if compared with another persons—it is of pretty moderate strength: the object to be borne in mind by bleeding in this case, is to excite, by removing oppression from the brain and circulation, and not to subdue the action of the heart, that it should be taken from the patient whilst continuing in the recumbent posture,—and here I must insist once for all, that on no account and for no purpose is the patient to be permitted to sit up, or leave the recumbent state, or sickness

almost immediately takes place; the evacuations should therefore be received in a bed-pan, or cloth; and the blood be taken from a rather small orifice, that, the stream being in consequence small, the system may have time to accommodate itself to the deprivation,—the effect of which, however, should be carefully watched—the operator keeping his finger during the time on the pulse, at the same time encouraging the patient by suitable conversation;—when, at the instant it is found to flag, without reference to the quantity withdrawn, whether much or little, the finger should be placed over the orifice; but it must be borne in mind, that fear, nausea, or sickness may occasion this result, that should the quantity taken have been small after a few minutes—if the pulse recovers its wonted strength, as it is an object to carry it to as great an extent as the circumstances of the patient admit—the finger may be removed from the orifice in the vein, and the blood allowed again to flow, with the precautions before specified; but should after a further small loss, the same result ensue, it is clear that any additional attempt at this time, would be injurious; though it may be afterwards practiced, as excitement becomes developed, either in relief of spasms, sense of burning heat in the stomach, or pain in the head, or oppression of breathing: and with the precautions I have given, may be frequently put into practice, and without the possibility of harm—but on the contrary with the happiest effect; for in this disease small bleedings in relief of the engorgement of the brain, stomach, and heart, are clearly and most forcibly indicated. (See case A. in the Appendix.) The same intention is

partially fulfilled by the clysters, but as warmth and excitement become developed, evinced too by the desire the patient has for cold water—these may be aided, or superceded by a weak and cold solution of Cheltenham or Epsom salts, or of cream of tartar, with which the patient may be now indulged—in the quantity of a wine-glassful at a time, instead of the cordials—which would now prove injurious; these will not, however, supercede the calomel, the necessity for which still continues, not only till bilious stools are procured, but even then, though in smaller doses, till healthy evacuations follow. It may however now, on febrile symptoms taking place, be well to combine it, with an equal weight of James's fever, or antimonial powder, and give it, if it is preferred in the form of pill; but mind if the calomel is thus combined, acids, such as cream of tartar, are not admissible, as an emetic compound would be the result. The calomel and antimonial powder we would now advise, in the proportion of two grains of each, every two hours, with a tea-spoonful of Epsom or Cheltenham salts, in a claret-glassful of water with every second dose: and if there is much thirst, the patient may at the same time be allowed, a wine-glassful of barley or cold water every half hour; and the same be continued, till the secretions of bile and urine are restored—when, and not before, may the patient be allowed some sustenance, the best of which will be *light* beef tea, or chicken broth, for it must be remembered, and borne in mind, during the convalescence, that in proportion to the feeble state of the patient, so is the stomach weak, and powers of digestion.

Many have an objection to salts, where this is the case two table spoonsful of castor oil may be substituted, or a dose of rhubarb and magnesia when this is preferred. Should the operation of the purgative be attended with much exhaustion, it may be necessary to support the patient with some spiced broth, wine and water, or mulled wine; or it may even be necessary to moderate it if there is much sinking—by a dose, of from twenty to forty drops of laudanum; but this is providing against contingencies, which with moderate care and attention will seldom be found necessary.

The secretions from the bowels are now sometimes so exceedingly acrimonious, that in passing along the line of bowels and from the anus, they produce, from extreme irritation—very considerable exhaustion; when this is the case it will be advisable, to inject an occasional emollient clyster, of starch or thick congee water, with oil; to the first of which, may be added a tea-spoonful of laudanum, and this repeated if necessary; at the same time hot flannels may be applied to the belly.

In the treatment recommended, we have had in view an ordinary attack of the disease, and coming on with symptoms of indigestion, or stomach derangement; should however the disease, which it not unfrequently does, have made an insidious approach, under mask of a simple loose state of the bowels, and from the continuance of which, the patient is much exhausted; in a case of this sort it may be necessary to quiet the system, and arrest further action of the bowels, till a certain degree of excitement of the system becomes developed; this

may be effected, by adding a grain of opium to the first dose of calomel, or an equal proportion (thirty drops) of laudanum, and which it may be necessary to repeat, but it is only under these and the like circumstances that opium can be recommended.—The treatment in other respects becomes the same, save, that in such cases, rhubarb and magnesia, or castor oil is to be preferred to salts, in the stage wherein these are recommended; and that bleeding and clysters can only become necessary, in the relief of the symptoms we have pointed out, when excitement becomes developed: excepting, when there is experienced, a sense of oppression and distention about the stomach and bowels, when the clysters may be advisable; otherwise it is to be feared, the stomach will be affected with sickness, which will obviate all our attempts at relief. Should there be burning heat of stomach, while at the same time the body is death-like cold, it will be in vain to attempt resuscitation with stimulants, calomel is the only one admissible,—the stomach being in a state of inflammation, a scruple may be given every hour, and at the same time, as there is a great desire for cold water, and nature's craving should be respected, a table-spoonful or two may be allowed every five or ten minutes, but not more at a time, as the stomach is in this state very irritable, and were a quart to be given, it would not satisfy the patient, who would desire as much more five minutes afterwards; that this precaution is indispensable.—The clysters are also in this case to be continued; and should the sense of heat in the stomach be great, a dozen leeches may be applied over the part, and after their removal a flannel wrung out in warm

water may be applied, and with this covering exposed to the air, so as to encourage a little evaporation if grateful to the feelings of the patient; it should however be observed, that the temperature be not too much reduced in this way.—If the pulse admits of it, or as general excitement becomes developed, bleeding may be resorted to, particularly if there are spasms, with the precautions I have already enjoined in having recourse to this remedy.

There is another remedy, simple in the extreme, always available, and speaking both from personal experience and observation, I may add, of powerful operation, which is the fan or hand punkah—it not only renews the air, but condenses it, and thus aiding the respiratory function, assists in no inconsiderable degree in supporting the actions of life: that I cannot too earnestly recommend its uninterrupted use from the earliest period of attack; it is at the same time, exceedingly grateful to the patient.

Having given most ample instructions for the treatment of the disease under its more ordinary forms, we must now consider its less frequent varieties; the first that we shall notice, is the malignant or asphyxia species, the subjects of it being in general suddenly attacked with dizziness, ringing in the ears, with deafness, and dimness of sight; the contents of the bowels are at once discharged, after which the conjee water-like stools come on—characteristic of the disease; and not unfrequently vomiting of the same description ensues,—a mortal coldness, extreme prostration of strength, with arrest of the circulation, and a ghastly livid coun-

tenance succeed almost immediately, and death follows with hasty strides, if prompt and decided measures are not at once put into practice;—a scruple of calomel should be instantly washed into the stomach with a couple of spoonsful of hot brandy and water, and the latter, alternated with thirty drops of aromatic spirit of ammonia, or hartshorn in two table-spoonsful of water, should be repeated every ten minutes; and as soon after as possible a warm salt water clyster should be administered, to which half a tea-spoonful of hartshorn may be added, and repeated every ten minutes or quarter of an hour; at the same time hot flannels should be applied to the region of the heart, and the extremities well compressed, and rubbed with the same—besprinkled with hartshorn or hot salt, and these measures be diligently pursued till resuscitation ensues, when the stimulants should be gradually diminished, and as excitement becomes developed, bleeding, with a continuance of the calomel, and evacuants be put into practice upon the principles already laid down; the case differing in no respect but in degree from an ordinary attack. And the same obtains with the species we have next to consider, which is lowest in the scale of severity, and bears no indistinct resemblance to an attack of common cholera morbus. It generally comes on with feelings of languor, cold chills, muscular pains, head-ache, nausea, distention or oppression about the stomach, and symptoms such as in general precede an attack of fever, then follows vomiting of slimy or bilious matter, with purging of the same description, attended with griping;

severe spasms, much thirst, and frequently* heat of skin.

In the early or cold stage of attack, a common emetic may be administered, or the stomach evacuated by drinking plentifully of warm water; and after its operation, a scruple of calomel with a small quantity of warm wine and water or ginger tea be given, and warm flannels externally applied:—but the principal features of this species, being, as in an attack of fever—the higher range of excitement of the second stage, stimulants must be more cautiously administered; and on the supervening of this stage, bleeding and evacuants may be more actively employed: added to which, and to equalize the circulation, the patient may be immersed for a quarter of an hour or longer in a warm bath, the temperature not exceeding 98 degrees, or as is comfortable to the feelings of the patient. Clysters are as strongly indicated in this as in every other variety of the disease, for as Dr. Armstrong observes, “The benefit resulting from large clysters, has not been rightly esteemed; but from repeated trials I can recommend them as remedies truly worthy of notice, in abdominal inflammations, often inducing copious motions in a very short time, and contributing to allay retching and vomiting, so that medicines afterwards prescribed will not be rejected by the stomach.” Personal experience also justifies my recommending them in the strongest terms; twice in my case was vomiting induced, by merely restraining the desire to stool: a forcible argument

* I say frequently, as the spasms occasion perspiration to be thrown out, which renders heat of skin by no means constant.

in my opinion, in favour of their employment in an irritable state of the stomach.

The stage of collapse—if the patient has been timously seen, and the means recommended in the previous stages steadily pursued, there will be little fear of this happening; that the debility ensuing will be of the direct kind, requiring the patient's being properly supported with light nourishment, such as spiced soup, sago and wine, and so forth. And when the secretions of the bowels assume a pretty healthy appearance, a grain of the sulphate of quinine, or a tea-spoonful of bark powder in a glassful of port wine, three or four times a-day, will be a very suitable remedy, and which should be continued till health and strength are established. Should it, however, so happen, that the patient has not come under treatment till an advanced stage of the disease, and the symptoms of excitement having lapsed into this, of collapse—it is in this case a little opium may be of service; but it should always be conjoined with calomel, not only to support its stimulating action, but with the hope of ultimately bringing about a healthy reaction, and with it the restoration of the natural secretions; a scruple of calomel with two grains of camphor, and half a grain of opium, rubbed down and suspended in a spoonful of conjee, should be the first dose; and six of the first, two of the second, and a quarter of a grain of opium may be repeated every hour afterwards, washing it down with a spoonful of warm wine and water, and the latter, or the same quantity of light spiced broth, may be given between each dose.

In this case, blisters too may be of much service;

to the head one should be applied extending down to between the shoulders; another may be also applied over the stomach: the skin being in this case so extremely torpid, I should advise, that the parts be not only made warm prior to their application, but that the blisters be besmeared with a composition, made by rubbing ten grains of the oxymuriate of mercury, with a drachm of cantharides, and a little oil of turpentine together, and that some of it, also, be well rubbed into the parts: and further, that some camphorated mercurial ointment be well rubbed in, under the arm-pits, and on the inside of the thighs, for as I have elsewhere said of mercury—it is a powerful and general stimulus, and a remedy of all others most particularly indicated in this disease, that if its action can be brought to bear upon the system, we may sanguinely hope and look forward to a favorable termination;—in which opinion, I am supported by Dr. Armstrong's experience in the congestive typhus, as well as Dr. Southwood Smith, in his treatment of this stage of fever.

In furtherance of the same intention, I would suggest the inhalation of mercurial vapour, by sprinkling some of the red sulphuret, or calomel, on a red hot iron in the apartment of the sick*—con-

* A better means perhaps would be, placing the hot iron, which may be a common one used by laundresses, on a plate or tile, and enclosing this in a box; which, after placing under the bed-clothes of the patient, and the mercurial being sprinkled upon the iron—the bed-clothes being supported either by the hand or a frame of hoops, and the edges of the clothes being tucked in all round—the vapour would have access to the whole surface of the body, and the patient at the same time enclosing his head would also inhale the vapour. I cannot help thinking, that the operation of mercurial inhalation, would be found singularly useful in cases of poisoning by opium and other narcotic substances, in which the powers of life are so extremely prostrate, that they are but little suscep-

sidering not only that absorption goes on from the lungs more actively than from any other surface of the body, but that it may excite the pulmonary capillaries to which it is directly applied, and be the means of restoring a very important function.

Hot mustard poultices should be also applied to

tible to the agency of ordinary stimuli: and perhaps in Tetanus also, in cases of extreme urgency.—Quere, would not the nitrous oxide, be the best preparation of mercury for this purpose? as its decomposition would be attended with an evolution of oxygen gas.—In India, where caned cots are at hand, the heated iron might be placed beneath the cot, and the same expedients adopted, as with the spirituous vapour bath, which I suggested some years back, and was thought by some to have been very usefully employed in the treatment of cholera. I shall here detail the plan, as a very simple and expeditious means of imparting heated vapour; and which may be often employed in this country with advantage, in the treatment of fever, rheumatism, and various complaints. The patient being laid upon a folded blanket, on the tape or cane-bottom of a cot, under which a soup-plate being placed, containing rum or any inflammable spirit, and this being set fire to, and a blanket being thrown all round between the frame of the cot and ground, the heated vapour will ascend through the canework of the cot, and impart its temperature to the patient; over whom a blanket should be extended sufficiently large, that it may hang over the frame of the cot, and admit of its being kept elevated by an attendant, several inches above the body. As the combustion of the hydrogen of the spirit produces water, which is held in solution by the heated air, it is a vapour-bath, without the inconvenience of excess of moisture, but sufficient, to relax the skin and elicit perspiration.—When it is desirable to increase the stimulus beyond the immediate application of heat, as in the medicated bath, it may be effected in the following simple way;—a smaller vessel, may be placed within the one containing the inflamed spirit, in which is a solution of camphor, ammonia, or any appropriate fluid; this the heat of the surrounding flame will convert into vapour, and thus will the bath be medicated. Attention should be paid to the centre vessel, that the sides of it be sufficiently high, a metallic tumbler would very well answer the purpose, or the vessel—as a tea-cup, may be supported above the flame,—the object being to prevent the contents being boiled over, or the vapour arising from it being inflamed. The temperature required may be regulated by the number of vessels, or extent of burning surface.—It has an advantage over most other means in use for this purpose, that it is attended with little expence, and is always available. When

the extremities, and bags of heated sand, or bottles of hot-water beneath the bed-clothes. Clysters in this stage would be only annoying the patient, but on resuscitation taking place, the bowels may be relieved in this way, and the treatment afterwards conducted on the principles already detailed.

SECTION II.

MEANS TO BE PURSUED IN PREVENTION OF THE DISEASE.

SINCE the cause of the disease is now known, the subject of its contagious or infectious nature requires no refutation, further, than stating, that why many have been attacked living in the same house, or neighbourhood,—is clearly referrible to their

a cot of the description is not at hand, a caned bottom chair will answer the purpose, but attention must be paid to keep the blanket surrounding the patient, and attached round the chin—fully distended, that the vapour may have free access to every part of the body; I had recourse to this, in an attack of sciatica, with the greatest advantage, and at another time, during the cold stage of fever, with equal benefit.

Having suggested the employment of mercurial inhalation in the treatment of tetanus, I would ask—has not the success, which it is undoubted, has often attended the practice of administering stimulants in this affection, which is assuredly dependent on inflammation, in some portion of the spine or nervous structure,—to be accounted for, upon the same principles as stimulants are now so successfully administered in the treatment of burns? their operation appearing to me, as it were making a diversion—by inducing general excitement, to the relief, or subduing the partial one, already existing! and if so, mercury appears to me, of all stimulants the chief, or one most indicated in this disease: indeed, might I not adduce in support of these views, the success which so often attends its use in Iritis, and many other topical inflammations:—and in which cases is not this its mode of operation?

all being exposed to the operation of the same cause—or source of malaria: and that, in a ratio with the strength and health, and therefore less susceptibility, as well as locality with regard to the morbid cause—have others been preserved against its influence:—this fact was most forcibly illustrated in the attacks of the disease at Clapham. I have the authority of Dr. Spurgin for saying, that the little and the more delicate of the boys, as well as those who entered more ardently into the *fun* of assisting in the clearing of the cess-pool, were those who suffered most severely. I shall conclude the subject, with the following very excellent instructions, copied from Mr. Annesley's work—in prevention of the attack, as nothing I am of opinion can be more judicious. “All that I can say under this head, may be comprehended under the general injunction, of avoiding the predisposing and exciting causes of the disease. Whatever tends, directly or indirectly, to debilitate or fatigue the system; whatever lowers its vital energy, as excesses of every description—disposes to the operation of the efficient cause of the malady. On the other hand, I am fully persuaded, that whatever tends to preserve this energy, serves to render the system impregnable to its operations.

“Exposure to cold, to chills, to the night-dew, and to wet and moisture, ought carefully to be avoided; and if at any time these exposures are inevitable, the system should be fortified against their effects: but the mode of fortifying the system requires consideration. This should not be attempted, unless better means are not within

reach, by wines or spirits; these generally leave the system, as soon as their stimulating effects have passed off, more exposed than before to the invasion of disease. Permanent tonics, however, and those more especially which determine to the surface of the body, at the same time that they improve the tone of the digestive viscera, and promote the regular functions of the bowels and biliary organs, may be resorted to on such occasions. For this purpose infusion or decoction of bark, or of calumba, may be taken with the spiritus mindereri, or any warm stomachic; or the powdered bark may be exhibited, combined with the spiey aromatics. The same medicinal means may be also attended to, whenever the disease prevails at the place where the individual resides, and should be put in practice when he retires to sleep, and as soon as he rises in the morning, before he leaves his apartment. He should avoid, also, sleeping in low and ill-ventilated apartments; and be equally distrustful of sleeping near or even of passing through, in the night time, marshy or swampy districts. If, however, these latter precautions cannot be taken, the medicinal means already suggested should be adopted.

The bowels should be attended to, and their functions regulated; but in no case should this be attempted by debilitating purgatives, or by salts. The warm stomachic laxatives, and these combined with tonics, may be adopted with advantage, as occasion may require. The surface of the body should be kept in a warm perspirable state; but excessive perspirations should be avoided.

The diet should be regular, moderate, and easy of digestion. Whilst low living ought to be shunned, its opposite should never be indulged in. The stomach ought to have no more to do than what it can perfectly accomplish, without fatigue to itself, and to the promotion of its own energies. It must never be roused to a state of false energy, by means of palatable excitants, or weakened by distending it with too copious draughts of weak diluents.

The state of the mind ought to be regulated in such a manner, as not to be excited much above, or lowered beneath its usual tenour. The imagination should not be allowed for a moment to dwell upon the painful considerations which the disease is calculated to bring before the mind; and least of all ought the dread of it to be encouraged. There is a moral courage which is possessed by individuals who are even the weakest, perhaps, as respects physical powers, and which in them resists more efficiently the causes of intertropical diseases, than the bodily powers of the strongest, who are not similarly endowed with this species of mental energy. Those who dread not the attack of disease, more especially of epidemic diseases, and who yet possess sufficient prudence to avoid unnecessary exposures to their predisposing and exciting causes, may generally be considered as subjected to comparatively little risk from them. This, I am persuaded, is particularly the case as respects epidemic cholera, and I wish to impress it upon the minds of those whom the observation concerns.

APPENDIX.

PART I.

CASES AND OBSERVATIONS—ILLUSTRATIVE OF THE
TREATMENT RECOMMENDED, AND IN SUPPORT OF
GENERAL CONCLUSIONS: WITH REMARKS.

The following Cases are extracted from the Report of the Madras Medical Board. For the convenience of reference, and in support of certain points of practice, they have been divided into sections.

SECTION I.

1. "Private *John Lumsdaine*, a patient in the Garrison Hospital, was seized with vomiting, and purging, of watery discoloured fluid, in the night of the 9th instant, between 11 and 12 o'clock; when I saw him about an hour afterwards, the vomiting and purging had ceased, though he retched two or three times afterwards, but ejected nothing from his stomach. He complained of cramp, or spasms in his legs, and also of both hands, which were so violent as to induce him to scream aloud, several times—his skin was below the natural temperature, and dry; and his countenance was sunk and dejected; tongue dry, and he complained of increased thirst; pulse 104, contracted and feeble. He took eighty drops of laudanum in some hot brandy and

water, which was directed to be repeated every two hours; was immersed in the tepid bath, when on being replaced on his cot, a blistering liniment was carefully rubbed into the epigastric region, and stimulating frictions were diligently applied to his extremities; and he was directed to take a table spoonful of strong brandy and water, to which was added twelve drops of laudanum and a like quantity of æther, every ten minutes; and an anodyne injection, to which was added a solution of assafoetida, was directed to be thrown up every hour or two, as appearances might indicate.—While in the bath, his pulse became much fuller and stronger, and he expressed himself as being greatly relieved by it; soon after he was laid on his cot, he felt an inclination to sleep, which apparently was prevented by a return of the spasms. The surface of his body became gradually cold, and the bath was again had recourse to.—4 A.M. remained in the bath about 12 minutes, and being languid and faint, he was removed to his cot again, when he dozed for about a quarter of an hour, during which period he continued perfectly free from spasm; after which time, the twitchings and spasms of the lower extremities returned, gradually ascending towards the trunk, affecting the abdominal muscles, as well as the diaphragm, and other muscles subservient to respiration, in a particular manner; breathing became interrupted and difficult, with great anxiety about him; and he was bathed in cold and clammy sweats; had a collapsed countenance, with eyes much sunk in their sockets, and there was a tendency to retching at times, but nothing was thrown up from the stomach, pulse 110, contracted, and

weak.—6 A.M. the patient now complained of a sense of heat about the epigastrium, and the laudanum and æther draughts were directed to be given in a table-spoonful of strong camphorated mixture, instead of the brandy and water ; and the fomentations, injection, liniment, and frictions, were persevered in.—The cramps continued to increase, as well in frequency as in severity ; the pulse at the wrist was not to be felt ; and his body was covered with cold clammy sweats, with extreme prostration of strength. He gradually became insensible ; deglutition impracticable, and he expired soon after eight o'clock, A.M.

Remarks.—*Lumsdaine* arrived in India about four months ago, had been almost constantly in his regimental hospital from that time, until the departure of the corps from the Presidency, a few days ago, when he was transferred as a patient to the general hospital, labouring under chronic ophthalmia, for which, in the acute stage of the complaint, he had been subjected to repeated abstraction of blood.—In the above case, therefore, it is probable the living powers were much weakened, and the constitution under those circumstances that peculiarly favored the operation of those causes which produce spasmodic cholera, which, in this instance, I have reason to believe, was an incautious exposure to the cold and damp north-westerly winds, in the beginning of the night in which he was taken ill.”—Fol. 260.

2. “Lieutenant-Colonel *T.* ætat 45, October 31, 1828.—At one o'clock, P.M. he sent for me, having had several evacuations resembling water, with a

white sediment; has loss of appetite, and nausea. I advised him to take 20 grs. of calomel, which he refused. In half an hour after, I visited him again; and as he would not take calomel, I prescribed 100 drops of Tinet. Opii, in 2 oz. of brandy. Pulse strong and natural, 75.—4 o'clock, was seized with a vomiting without bile.—His strength suddenly failed, and his pulse became much weakened; no stool since I saw him; a large dose of Tinet. Opii was given, which he threw up; it was repeated, and he retained it for a short time; several more doses were prescribed, which he generally vomited soon after taking; has no purging; has severe spasms in the calves of his legs.—7 o'clock. Skin became cold; pulse scarcely felt at the wrist; he consented to take 20 grains of calomel, and again in the night, 20 grains more, which he retained. Friction with hot sand, &c. was applied, but without effect; he became very restless, and was covered with cold perspiration; no pulse, and he appeared sinking fast.—Oil was administered at 8 o'clock A. M. the following day, and he died at 4 o'clock P. M.—The spasms every now and then returned, to the hour of his death.

Dissection.—In the stomach was found a quantity of green bile, and its inner surface was throughout inflamed, of a dark red colour, to which adhered some dark-colored mucus.—The upper part of the duodenum was slightly inflamed; in the cœcum was a quantity of green bile. The liver was quite healthy, and so were the contents of the thorax. The brain appeared to be of a firmer texture and more full of blood than usual; and also the membranes enclosing it.—About half a drachm of blood

was seen extravasated under the pia mater, in the upper part of the left hemisphere of the brain.

Remarks by the Superintending Surgeon.—I think it right to add a few particulars to Mr. De Lisle's account of this case, as I was at Chicacole at the time of Colonel T.'s decease, and was the only person, besides Mrs. T., present about 9 or 10 o'clock on the night preceding his death, at which time a very marked change took place, suddenly, in his condition, viz. that, from a state comparatively composed, during the intervals of the cramps of his limbs, which every now and then returned with very great violence, and then abated, leaving only a latent sense, as he described it, of the spasms, he all at once used some expression altogether irrelevant either to his situation or to what we had been talking of before, and from that time got into a low state, evidently of a comatose nature, with extreme restlessness and impatient desire for almost continual change of posture, such as marks the most imminent danger in the advanced stage of this fatal disorder; perhaps with rather more of coma than usual, although he was evidently perfectly sensible when roused, particularly towards morning, and expressed his wishes with perfect distinctness, though with great impatience, when he wanted to be turned, to have his legs rubbed on account of spasms, or above all, to have water to drink, his importunity to be allowed which was, after a time, exceedingly violent.—Almost immediately before the above change took place, he had observed to me, in the most distinct and collected manner, that neither the laudanum nor the brandy which he had taken, appeared to produce any tendency to drow-

siness, or to affect his head in any way whatever ; but that the last spasm had got above his knee, and, although he felt easy at the time of speaking, he thought his was a kind of attack that would very quickly carry a man off, unless he had very active assistance.—While talking in this manner, he all at once complained of his stomach, and I was induced from this recurrence, to give him about a drachm of laudanum in a tea-spoon, which he had scarcely swallowed, when he turned over in the most violent pain, apparently ; his pulse undulating and hands cold, and using the incoherent words above alluded to ; had a violent fit of cramps and vomiting at the same time.—As this dose of laudanum was almost instantly rejected by vomiting, and what he had before taken, though Mr. De Lisle had gone as far as a drachm ss. for a dose, had apparently produced no effect whatever ; the desperate circumstances of this case, led me now to give, as soon as I could get him to swallow, nearly 2 drachms of laudanum at once, which I did under the impression that the momentary incoherence during the cramps, not having been preceded by any tendency to drowsiness, must be an effect of the general spasmodic action which the remedy had altogether failed to subdue. This dose of laudanum was retained for a time, but also thrown up ; after which, he obstinately refused every thing in the way of medicine, and as the laudanum either was bad, or from the violence of the disease seemed to have no effect in checking either the vomiting, or cramps, we were afterwards only anxious to get him to take a second quantity of calomel, which he positively refused ; but which we afterwards took the opportunity of

exhibiting by stealth in some conjee, which was given him by half glassfuls, at the time when his calls for drink were most violent.—The oil next morning was given him in the same manner, so that he had taken the greater part of a glass, mixed up with warm water, before he appeared to notice it.—I have since regretted that I did not propose venesection in this instance, instead of pushing the laudanum to the extent it was done, when the symptoms were found to defy its power; particularly as Colonel T. was a stout man, and for many hours after the attack could probably have borne depletion well; but of the effect of this remedy I have had no experience to form a judgment upon, and the evidence of the utility of laudanum, in violent spasmodic cases, in doses that would at other times certainly be considered unsafe, urged me irresistibly not to give up the hope of success by perseverance in this remedy where life was so apparently in danger from extreme spasmodic action in the system; yet perhaps the practice of bleeding in this disease may be somewhat analogous to its use in the convulsions of puerperal women, for which it is, I believe, the only remedy that can be depended upon, although inflammation is not even suspected.”

3. “ I have the honour to communicate for the information of the Medical Board, the circumstances connected with the death of Lieutenant Colonel *M.*—7th November, 1820, about 11 o'clock A. M. the colonel sent for Mr. Assistant Surgeon Knox, who was in the adjoining house—he stated

that he was purged and felt inconvenience from debility—Mr. K. observed the sunken state of countenance, and the patient complained of deafness ; 80 drops of laudanum with some peppermint and brandy were given—Mr. K. observed some water mixed with small fœculent particles in the pan ; the patient complained of nausea ; a dose of calomel was proposed but postponed, from the patient's fear that it would be rejected ; Mr. K. quitted the house for a few minutes, and on being called back, found the patient had vomited the contents of the stomach ; the laudanum was repeated, Mr. K. had left the room, and on re-entering found the patient, who was in the act of changing his dress, sitting on a chair with the head drooping on the chest, and some fluid on his dressing gown and shirt—he stated that he was not sensible of what had happened : he was laid down and covered ; at this time, about noon, Mr. Heward arrived, who urged the taking 40 drops more laudanum, which the colonel had hesitated in taking ; nitrous acid was applied to the region of the stomach, and hot sand with friction applied generally.—Mr. White and I arrived shortly after, and the case was witnessed by us all to its close—the prostration of strength, clammy sweats, and imperceptibility of pulse, precluded the possibility of using venesection with any effect.—Laudanum, ammonia, and brandy with infusion of ginger, were frequently given, and an opiate injection thrown up, but without beneficial effect ; a large watery evacuation was passed ; he had occasional cramps, and towards the close, some uneasiness or pain in the stomach ; the patient expired at 7 P.M.—The body was ex-

amined by me on the following morning, in the presence of the superintending surgeon, and there was not an appearance of disease in the thoracic or abdominal viscera ; a remarkable feature in the case was the absence of what I have heretofore viewed as an invariable symptom of the disease, the intense burning heat in the stomach with insatiable thirst.—It is ascertained that the bowels had been disordered the whole of the previous day.”

4. “Captain *P.* of a plethoric habit, and in general enjoying the best health, complained on the 9th of June, of being bilious ; was advised to take a dose of calomel at bed time, but neglected to do so. About 2 o’clock in the morning of the 10th, was seized with griping and purging, in consequence of which, he was exposed to an extremely cold bleak north-west wind, in the frequent visits he was obliged to make to the necessary, without any additional clothing to his sleeping dress. Towards morning the purging ceased, and he slept a short time ; at 7 A. M. he felt well, but took a dose of Cheltenham salts—at 8 A. M. after taking a cup of tea, was attacked with vomiting, followed so rapidly by all the most violent symptoms of the epidemic, that he had scarcely time to retire to his bed room. Mr. Surgeon Macdowal who lived in the next house, was immediately sent for, and administered the usual remedies, after opening a vein, with slight relief to the symptoms. At 9 A. M. I received the information of his illness, and found him in the advanced stage of the disease ; his eyes sunk, and hollow, expressive of great anguish, and despair ;

the eyelids purple; the pulse scarcely perceptible; his voice, (naturally sonorous and powerful), feeble, and husky. Painful spasms in his limbs, which were damp and cold; the skin of the fingers and toes shrunk and corrugated, as if steeped in water for some days. He had had no vomiting and purging for some time—the veins of the arms were again opened, but the blood would scarcely flow; the draughts were repeated, his limbs were rubbed with large bags containing hot salt: for this purpose 10 people were employed constantly. About 10 A. M. his eyes brightened, his pulse became more perceptible, he expressed himself as feeling better, and begged the hot frictions might be continued, as ‘they did him good,’ and he ‘liked them much.’ In a short time after this, he made a violent involuntary effort to evacuate the bowels, and a few drops of white water only were ejected; his pulse immediately stopped, and he became dreadfully restless. In addition to the remedies he was taking, an opiate enema was preparing, and cajeputi oil to rub over the epigastrium, when he suddenly turned over to his right side, drew a few long slow inspirations, and died about half-past eleven.”

5. “On Sunday the 13th of May, 1821, about a quarter after ten o’clock A. M. I found Captain *W.* labouring under an attack of ‘Cholera Epidemica,’ without his having any suspicion of the nature of his disease, though by his own account, the purging and vomiting had continued from before day break until then. His eyes, and countenance had those very peculiar appearances, so highly diagnostic of

this disease ; his pulse at the wrist perceptible, but hurried, small, and easily compressed ; he complained of great exhaustion ; had not been seized with cramps, nor any burning sensation about the præcordia. While I was preparing some medicine for him, he had an evacuation of white semi-opaque fluid ; and on lying down again he took the following draught.

Tinct. Opii. gts. lxxx. Pulv. Ipecac. grs. xxx. Aquæ, ℥ss.

This remained on his stomach for about 20 minutes, during which time, he remained quiet and easy. About 11 A. M. by a sudden spasmodic effort, evacuations took place from his stomach and bowels, and he was instantaneously seized with cramps in his fingers, followed rapidly by similar ones in his toes ; eighty drops of laudanum were immediately given, and his limbs rubbed with bags containing hot sand, while I opened a vein in the arm ; on puncturing the vein, the blood, thick and black, flowed in a large stream, slowly over the arm, until about 24 ounces were abstracted, when it suddenly stopped, on the recurrence of an involuntary evacuation per ano, and a violent cramp in his thigh ; his pulse now became imperceptible at the wrist and temple ; he got restless and agitated ; cold sweats broke out over his body, and the thirst was most urgent. A draught containing one drachm of æther, and 60 drops of laudanum, was exhibited during the preparation of a large dose of calomel, and extract of colocynth, a remedy recommended by a medical gentleman present, as having proved very useful lately in his practice. The frictions were continued. The patient retained the bolus and other remedies

on his stomach; his pulse became again perceptible at the wrist, the spasms ceased; but the restlessness and anxiety increased; his limbs and forehead were bedewed with a cold clammy sweat, and the spasmodic action of the intestines continued. The spirituous vapour bath, having been got ready, by the advice of the staff surgeon, was used and persevered in, but seemed to have little or no effect on the vital powers; the carotids being the only arteries in which any thing like distinct pulsation could be felt. After being exposed to the action of the bath for a considerable time, he expressed a desire to sleep, and the spirits were withdrawn; he continued quiet for a few minutes, when the spasms returned, accompanied by the other symptoms; the æther and laudanum were repeated, and he was again subjected to the action of the vapour bath, but had scarcely felt its influence, when he leaped out of bed, being seized with a fit of spasmodic asthma to which he had been long subject, fell back into the arms of a gentleman near him, and died in a short time after.—P. S. A sinapism, with garlic and vinegar, was applied to the epigastrium.”

6. “ *Rungapah Naik*, Sepoy, who had been admitted on account of being affected with psora, and for which he had been using sulph. ointment, was suddenly seized on the morning of the 26th, with violent vomiting and purging, accompanied by severe spasms of the muscles of the abdomen and extremities, which in about three hours after the attack, terminated in death—25 grains of calomel

and 100 drops of tincture of opium were given every half hour, and warm frictions used for the purpose of allaying the great irritability of the stomach and putting a stop to the progress of the disease, but with the exception of two or three doses, these medicines were instantly rejected, and nothing was evacuated by stool but something resembling a milky fluid. This is I believe, among the first cases that put on the appearance of cholera morbus among the regular troops at this station, though for a week previous to this period it had been known in the city of Nagpoor, where from 15 to 20 natives died daily, and even before this, in several villages to the eastward.—No other cases occurred until the arrival of the force from Chandah, on the 30th ultimo, when great numbers were suddenly attacked with the disease, particularly among the Bengal sepoys, of whom about 30 died in the course of the day. On the 31st, 16 were admitted into hospital with symptoms of cholera morbus, and every one of these belonged to the two companies of the battalion just returned from Chandah—whether the fatigue, and exposure to the sun, and the debility subsequently induced, are, in any degree, adequate to account for the disease having been entirely confined to those men who were exposed to these causes, it is extremely difficult to decide, as these do not apply to the natives in the city, nor to many others who have been attacked in a similar manner, and who have been completely exempted from any of these causes. The variations of atmospherical temperature were very inconsiderable.”*

* Might not the sulphur frictions have influenced this attack? which appears to have been a very severe one.—*Author.*

7. " August, 1818, at half-past 5 A. M. of the 16th, Corporal *Jones* of the M. E. R. was brought to the hospital with every symptom of the epidemic. He had been 12 years in India—and was not generally a hard drinker. From his own account it appeared that he had gone a short way to the front of the line to get some water from a nullah, about 9 P. M., that whilst there a sudden cramp had seized his lower extremities which rendered him unable to move, and that he had lain all night exposed, vomiting, and purging: his skin was cold and clammy—pulse extremely feeble and irregular; countenance much altered and collapsed, eyes sunk, great thirst. He was writhing with pain from the spasms of his lower extremities, and muscles of his abdomen, and the recti abdominis muscles were drawn up into balls, and his fingers and toes exhibited all the appearance of cramp.

R Calomel ℥ i. Tinc. opii gtt. cxx. Ol. menthæ ppt.
gtt. xx. Aquæ fort. (brandy) ℥ ii.

were given, the calomel being placed on his tongue and washed down with the draught. The medicine remained on his stomach: the extremities were well rubbed with spt. camphoratus. In an hour the medicine was repeated, his pulse had now become lost, and his skin covered with a profuse clammy sweat. The calls for cold water were constant, and he complained of burning heat in his stomach; strong warm brandy and water with spt. æther. vitriolici and tinc. opii were given on the spasms occasionally becoming very distressing; the diaphragm appeared to be much affected and he complained of pungent shooting pains across his chest, which caused his breathing to be very pain-

ful; a blister was applied to the epigastric region, every stimulant that could be thought of was given, and all retained on his stomach. He died at half-past 12 o'clock P. M."

Fol. 79.

8. "At 8 P. M. of the 17th, Private *Walker* walked to the hospital with the orderly corporal. He had been at roll call in the evening, and was suddenly seized with vomiting and purging, his skin was damp and cold, a small, weak, fluttering pulse, pain at the epigastric region, countenance much altered, eyes appeared to be sunk. This man although he had not been drunk for several days was an excessively hard drinker. His countenance was always thin and sharp, and his eyes particularly small. The calomel 1 scr. was placed upon his tongue and washed down with the draught as before given to Jones. He vomited this in half an hour, and had two watery stools; at this time his skin was cold and clammy, and his pulse altogether gone. He complained of great thirst, and of the spasms of his lower extremities, another powder and draught were immediately given, and repeated every hour. He suffered much from spasms, warm fomentations were applied to the abdomen and legs, and a stimulating liniment composed of pulv. lyttæ, and spt. terebinth. rubbed briskly over the epigastric region, his skin still continued covered with a profuse clammy cold sweat, great restlessness; spt. ammoniæ, hot brandy and water, were given with a view of stimulating the stomach, but he died at half-past 2 A. M. of the 18th. The body was opened at 3 P. M. about 12 hours after

death. The liver was found without any disease, the gall-bladder with a due proportion of healthy bile, the inner coat of the stomach slightly inflamed; appearances of congestion in the small intestines, spleen rather of small size and natural, large intestines natural, bladder empty and collapsed."

Fol. 80.

9. "The drummer who attended the funeral of these men, at 10 A. M. was himself brought to the hospital at half-past 11. He was put into the medicated warm bath, calomel, &c. and stimulants were given in as large quantities as in the other cases, but in vain. He died at 5 P. M." Fol. 82.

10. "Private *Clarke* was brought to the hospital on the morning of the 23d with the usual symptoms; collapsed countenance, cold skin, feeble fluttering small pulse. The warm bath and the remedies were used to the greatest extent as in the other men. His spasms and cramps were very violent, and the vomiting for the first hour very distressing. No relief was derived from any thing, and he died at 12 o'clock that night. The veins of *Clarke's* (both) arms were opened, and in that state put into the warm bath." Fol. 82.

11. "Whilst digging a grave for the drummer who died the preceding evening, camp colour man *Woods* was seized with cramps and vomiting, and was brought to the hospital at half-past 8 A. M. He derived much ease from the warm bath, and

wished it to be repeated. He vomited the first dose of medicine, but retained in four hours five other doses. He died at five P. M. Fol. 82.

“ During this day many cases occurred of this disease, but in a much slighter shape.—The vomiting and the spasms about the stomach and diaphragm were more distressing than in the former cases, but there was always considerable heat of skin—good firm pulse, and unchanged countenance. These cases excited considerable alarm amongst the men. In two of these cases there were constant and loud hiccough. The stomach rejected every thing if given in quantities. Tine. opii with æther vitriol were immediately thrown up—as if by some spasm of that organ. The calls for cold water were incessant. Frictions with camphorated spirits were used over the extremities, and a large blister applied to the epigastric region. They vomited nothing but viscid phlegm, and their stools although frequent were small, and in substance resembling white conjee or soojee and milk. The stomach was kept empty, and the vomiting much relieved by a pill containing opii 2 grs. camphor from 4 to 6 grs.; as soon as the stomach appeared more settled, a pill containing calom. 1 scruple, opii 1 gr. was administered and retained. This was repeated in four or six hours, purgatives were then given, but there was considerable difficulty experienced in producing stools. The pulv. jalap. compos. infus. sennæ, or solut. magnes. vitriolat. pil cathartie, and the enema nicotianæ did not produce any stools. The latter produced all its usual effects, deliquum colliquitive sweats but no purging. The croton pill of 1 gr. appeared to me in these cases to have had

the best effects. It produced as usual (as far as my observation has gone in the use of that medicine) in some vomiting and in others griping, but in all copious evacuations. By keeping the bowels open (and which was not difficult after this) no unpleasant symptom returned. In all these cases there was clearly a want of bile in the intestines, and producing that, caused immediate relief. Many cases of this description with spasms more or less violent, and with the stools of the same appearance as I have before described, were admitted during the 23d, 24th, and some on the 25th. They were relieved by the same remedies, but the difficulty of procuring stools was in all similar and yielded to the croton pill in several. No cases of the malignant epidemic appearing for many days, I was willing to hope it had entirely left us, but at half-past 4 of the 28th, Serjeant Scott was brought to the hospital with a livid contracted countenance, eyes sunk, no pulse; a cold sweat bedewed his whole body, his hands wet and shrivelled. He was immediately put into a warm bath in which several bottles of arrack were poured, and the colomel and tinct. opii, &c. given him; five doses were given and retained but he died at 8 P. M., not having been more than five hours ill. This man had returned from leave the day before, having been some distance on the Jaulnah road to meet his family. The exposure at night without a tent may be considered as one cause of the disease in him.

“ The vomiting in no one instance of the eleven cases that died in this regiment, ever interfered with the exhibition of the medicines; if the first dose was vomited the second and others were re-

tained; and calomel, laudanum, æther, aq. ammoniæ, wine or brandy, were given in vast quantities and never vomited.

“ The stomachs of those who were opened were invariably found half full of fluid, but there appeared a sudden depression of every vital energy; and those who died had more the appearance of persons labouring under the bite or sting of some poisonous reptile than from disease.

“ The livid colour of the lips and the sunken countenance were strong proofs of what a state of languor existed in the circulation; in one instance a fine young man who had been in perfect health an hour before, the loss of a very few ounces of blood was followed by retching, which was not allayed for some time.*

“ A very great number of the cases which appeared in the regiment, were reported either during the night, or early in the morning.—It is not easy to say what has been the cause of this destructive epidemic,—that exposure may be considered an exciting cause is evident, both in Europeans and natives.—No officer had an attack in the camp.—In natives the disease bore an exact resemblance to that of the Europeans—but the spasms in them did not cause apparently so much distress.

“ In one instance here a native was brought labouring under the most violent spasms, both of the lower extremities and muscles of the chest and

* Was this not a clear indication of its utility, oppression being removed from the brain, its energy was imparted to the stomach, and vomiting ensues, an effort of nature to relieve herself of the opium and other noxious agents administered—as occurred after the bleeding in the case recorded of poisoning by opium.—*Author.*

abdomen, but who had not either vomited or purged—he died in this state after a few hours illness.”—Report, fol. 85.

12. “With regard to the treatment pursued, it varied much according to the state of symptoms at the time, and the period of illness. It was stated in a former report, that every thing recommended by the experienced had been tried, but that nothing claimed any decided advantage, or superiority over another; some died, and some recovered, under each, and every method of cure. It seems to be tacitly admitted to be a disease of the greatest debility, and consequently every means is directed to rouse the sinking powers of life, and remove the irregular and morbid train of action in the system; indeed no one can look upon the disease without seeing what is wanting. To answer these intentions, strong stimulants, such as brandy, or arrack, either pure or diluted, together with calomel and opium, were employed. The spirituous liquors were given, neither in limited quantity, nor at any certain period, but just as the symptoms required; and the calomel and opium were made into pills in the proportion of one grain of the latter, to three of the former, two or three of which generally constituted the first dose, which were afterwards repeated as the circumstances of the case required; camphor was very frequently added to the above pills, particularly when hiccough came on; and these together with the application of warmth, and the use of friction constituted the chief means of cure.”—“Under this treatment, of 138 admitted, 74 died and 64 recovered.”

Fol. 202.

Case exhibiting the delusive amendment which not unfrequently takes place in the stage of collapse.

13. "A Serjeant, æt. 28, on the 25th April 1820, was brought to the hospital at 20 minutes before 2 P.M. in the last stage of cholera spasmodica: he was taken ill at noon, twenty ounces of black blood had been taken from his arm, and a draught was given him of tinct. opii. spt. ammon. aromat. et mist. camph. At the time of his arrival in the hospital, his pulse had entirely left his extremities, and his legs, arms, and body were covered with cold clammy perspiration; with that peculiar cadaverous smell which is usual in the most fatal of these cases; his eyes were sunk in their orbits, and there was a peculiar sharpness in all his features, indicative of general collapse, and great danger, his nails turned perfectly blue, the skin assumed the peculiar livid colour, which is common in these cases; and the palms of his hands and soles of his feet were blanched and shrivelled, as if they had been soaked in water for a considerable time; the cramps in his legs were very severe, and he complained of a sharp burning kind of pain at the præcordia, and some uneasiness in his head; he had been purged very often (15 times) and his stools were like conjee-water; tongue not much excited nor dry, but he complains very much of incessant thirst, and is excessively restless.

R calomel. gr. 20, drog. amar. ʒss. mist. camph. ʒss. m.

This was swallowed immediately, and washed down with some warm brandy and water: his extremities were well rubbed with some spt. terebinth; sixteen

leeches were applied to his temples, and twenty to the præcordia.—2 P. M. Respiration tolerably free, has neither been vomited nor purged since admission, spasms in upper and lower extremities extremely severe; the livid colour of the whole surface of the body, as well as the extremities increased. Stimulating enema; he takes warm brandy and water occasionally, and frictions are continued to his extremities.—A quarter past 2, passed the enema, but no fæces; the spasms are not at all relieved; the leeches have fixed upon his temples and præcordia; continue frictions.—Half-past 2, the leeches are doing their duty admirably, he is not so restless or so thirsty; the spasms have left him, but his skin continues cold, and there is no appearance of return of pulse: continue frictions.—3 o'clock, no return of vomiting or purging, but there is not any kind of improvement in his skin or pulse; he appears inclined to sleep, thirst less urgent, complains of a good deal of pain over the whole belly; the leeches are still doing their duty; his tongue is more excited than it was, but it is moist; apply a large blister over the lower belly; warm flannels to be continually applied to his extremities, and the following draught,

R mist. camph. \mathfrak{z} iss. aq. ammon. gtt. 30. æther vitr. gt. 20.
ol. menth. pip. gt. 4. m ft. haust.

A quarter past 3, has a slight return of spasms in his left leg; continue frictions. N. B. The leeches have fallen off from his temples, and the blood from their bites is as black as ink.—20 minutes past 3 o'clock, has become more restless and thirsty, calls for conjee-water which is given with brandy. Has just passed a watery colorless stool; respiration

rather hurried ; no pulse, coldness of the skin and lividness increased ; complains of pain, but does not know where ; has for the first time expressed fears of his situation ; the leeches are still drawing at the præcordia : continue warm frictions with flannel.—40 minutes past 3. He is asleep, breathes free, and there is a gentle warmth returned to his skin, but no pulse ; continue warm frictions with flannel.—4 P. M. slept for 15 minutes, says he feels tightness over his belly, and thinks it is the leeches ; he has again become restless, and calls for cold water ; he evidently despairs of his recovery ; no pulse, though his skin is certainly warmer ; a little diluted nitric acid to drink ;

Rept. haust. camph. c. drog. amar. ꝯss.

continue warm flannel.—25 minutes past 4. The skin is certainly much warmer, and there is considerably less lividness of the surface, and no cold sweat ; but there is no pulse either at the wrist or in the temples ; he is less restless, his eyes appear less sunk, and more animation in them ; he is perfectly sensible, does not complain of pain in his head, though there is more heat than natural ; his breathing more hurried than it was, though he does not complain ; he is very thirsty : apply 12 leeches to his temples, a little warm brandy and water.—5 P. M. skin very comfortable, but no pulse, says the blister is very painful, and he is becoming again restless, but he is certainly more collected, and there is less anxiety about him than he had one hour ago ; continue warm flannels to his extremities and chest. The leeches have fastened on his temples but do not appear to fill well, and those at the præ-

cordia do not appear to be very useful, wishes for some warm tea which is given to him.—Half past 5, no material change of any kind; finds the nitric acid drink very agreeable.

R calomel. gr. 15. opii. gr. iii. ft. pil. ii. stat. sum.

Restlessness increased, heat on the surface much improved, but no pulse; breathing becoming more hurried; no return of spasms, purging, or vomiting; continue warm applications as before; he got worse from this time; his breathing excessively hurried and oppressed, very great restlessness, heat about the head very much increased; he became insensible at half-past 6; and died 10 minutes before 7 N. B. The warm flannels were certainly attended with more benefit than I have ever witnessed from the vapour bath; the extreme coldness and clammy perspiration which is so common in this disease, and particularly at this stage of it, had nearly left him; his skin had a more natural heat than I have ever seen before in cholera. The leeches on the præcordia did not fill; the blood which flowed from the bites was quite black.” Fol. 279.

SECTION II.

14. “A Havildar, 25th June 1820, a short muscular man, ætat 37, was seized about 10 o'clock last night with vertigo and vomiting, succeeded by languor and weakness almost immediately; since which, he has had five evacuations, and frequent vomiting of watery matter; immediately after admission into hospital, vomited some thin whitish

looking fluid; sense of general weakness all over his body; uneasiness, or rather oppression about the chest, breathing tolerably free; giddiness still continues, moderate heat about the surface, with the exception of his feet and hands, which are cold; partial cold sweats about the lower extremities; great inclination to vomit, excessive thirst, eyes rather sunk, features seem sharp; made no urine since he was first taken ill, what he passed then was small in quantity, and high coloured; pulse 118, small and rather weak, tongue furred. Was brought to hospital between 6 and 7 o'clock this morning.

Capt. stat. submur. hydr. \mathfrak{z} j. superbib. decoct. oryzæ \mathfrak{z} ij.
 spt. lavend. c. spt. æther nitros. tinct. castor. aa. \mathfrak{z} ss.
 tinct. opii gtt. 40 ess. menth. ppt. gtt. 25. \mathfrak{m} ft. haust.
 —Habt. decoct. oryzæ. calid. et spirit. pro. potu.—Later.
 calid. admov. extrem. et uti frict. c. panno laneo per
 tot. corp.

Noon—no amendment; rejected the draught shortly after taking it—had it repeated, but the greater part was again thrown up; appears more restless, cold perspiration getting more general, breathing quickened and short, thirst very urgent, pulse falling off.

Rept. medic. ut antea sine tinct. castor.

3 P. M.—nothing remains on his stomach, symptoms much as before.

Habt. submur. hydr. gr. vj. opii gr. ss. tertia quaq.
 hora. Omitt. haust. et pot.—cont. alia ut antea.

7 P. M. pills retained, cold clammy perspiration increased, difficulty of breathing, pain on the right side of the epigastric region, and sense of burning

about the stomach; other symptoms still continue, pulse hardly to be felt.

Mit. sang. e brach. lb. iss.—impon. vesicat. mag. part.
dol.—rept. pil. et haust. ut antea si sit necess.—habeat.
decoct. oryzæ et spir. in nocte.

26th, on opening a vein in the right arm no blood would flow, the left fomented with a sponge soaked in hot water, and then a vein opened—when a thick dark coloured blood issued, and coagulated immediately; much friction used to the arm to promote the bleeding; often expressed the relief he felt in his breathing and giddiness, during the time the blood was flowing; pulse rose after it; blister has risen well; nausea still continued after the blood was taken away, but his stomach did not reject either the pills or the draught; had an evacuation of a dark watery appearance, and voided some urine about 12 o'clock last night; this morning complains of great weakness, and restlessness; skin still cold and clammy; pulse slow and weak.

R Extract. colocynth. co. submur. hydr. aa gr. xii.—M. ft.
pil. stat. sumend. superbib. spirit. gall. ʒi.

6 P. M. No evacuation from the pills, cold sweat diminishing slowly.

Injicer. enema comm. stat. habeat. pil. c. extr. colocynth.
co. gr. 8, submur. hydrar. gr. 6, h. s.

27th, glyster returned immediately, but he had several dark watery stools in the course of the night, perspiration much abated, thirst not so urgent, pulse 100, soft." The treatment after this was confined to calomel and purgatives, and he was discharged on the 7th. The same writer narrates two other cases of equal severity, treated in the same manner, and with like success. Fol. 281.

15. " A Sepoy ætat. 27, was brought into hospital on the 23d Oct. at 10 A. M., 8 hours after his first attack, with watery vomiting and purging, pulse not to be felt at the wrist, skin covered with cold sweat, complains of burning sensation in his stomach, intense thirst, tongue dry, and great prostration of strength; calomel 16 grains washed down with equal parts of brandy and hot water, hot bricks to his extremities, and to be well covered with blankets.—11. has had 2 watery stools; continue the hot bricks and brandy and water, to allay his intense thirst; let him have a clyster combined with two drachms of tinct. opii.—12. a return of vomiting, the clyster was rejected without doing any good; had one watery stool, skin a little warm, pulse not to be felt; continue as before.—2 P. M. no alteration; repeat the calomel and hot applications, and continue the brandy and water.—6 P. M. no return of vomiting, still watery purging; in other respects the same.—Half-past 9 P. M. I observed for the first time the diaphragm and muscles of respiration acting very laboriously, with great apparent difficulty of breathing; I ordered immediately a strong liquid blister to his chest, and took away with difficulty twenty ounces of blood from his arm—the blood was of the darkest colour and very thick; ten minutes after the bleeding, his pulse was feebly felt at the wrist, his countenance improved, and he thought himself much better; continue the brandy and water and hot applications as before.—12 o'clock, a large bilious stool of a most offensive nature, skin warm, pulse rising.—1 o'clock, left him asleep—next morning

took a purgative dose, and was convalescent on the 26th."

This is followed by another case of precisely the same description, and treated in the same way, and with like success. Fol. 260.

16. " A serjeant, ætat. 28, of robust constitution, and sober habits, was attacked on the morning of the 8th August with vomiting and purging, which were soon succeeded by excruciating pain all over the abdomen, and a sensation of burning and twisting as he termed it, in the region of the stomach; severe spasms of the lower extremities, and intense thirst, tongue white, pulse quick and rather tense, heat of skin natural; he was instantly bled in the recumbent posture to 55 ounces; when he became faint, but with perfect relief to the spasms and pain of the stomach; he now took tinct. opii. gtt. 80. tinct. cardam. 6 dr. mist. camph. 2 oz. ft. haust; in half an hour he was asleep, and continued so till 2 P. M. when vomiting returned, with short and difficult respiration, and a livid appearance of the face and lips; pain and giddiness of head, pulse small and quick, surface warm, no spasms, but an uneasy sensation in his legs; bleeding was again practised to the extent of 30 ounces, which completely relieved his breathing; pulse for nearly four hours from this time was not perceptible, and his feet and legs became cold, he was now placed on the vapour-bath cot, and a draught consisting of tinct. opii. 70 drops, liq. ammon 40 drops, tinct. card. 5 drachms, mist. camph. 1 oz. was given, he

slept for more than an hour; respiration then free, pulse small and soft, skin warm, stomach still irritable; passed some urine, no stool; an enema is ordered immediately, a blister over the stomach, with a scruple of calomel and port wine and water as before." From this time stimulants and purgatives were employed, he progressively gained strength, and on the 26th he returned to his duty.

Fol. 266.

17. "In the few cases treated at this place, at this time, where the blood could be got to flow in a stream and a sufficient quantity obtained, the violence of the disease was subdued, and they all recovered. A peculiar case occurred in one of my servants, who had been much exposed to the rain in Nagracoil, had attended the sick, and was exposed to the rain on the road to this place. The attack was severe; twenty-four ounces of blood were taken from his arm in a full stream, and the usual dose of calomel and laudanum given. He was soon afterwards reported fast asleep; about two hours after this, the disease had returned with increased violence; and when I saw him, the pulse could barely be felt occasionally vibrating; veins were opened in both arms, the blood sometimes came in drops, sometimes entirely stopped, and sometimes came in a stream for a few seconds; by persevering in this way, for above an hour, it came at last in a full stream; and about sixteen ounces were taken; after a severe struggle, he recovered, and is now only suffering from an acid blister."

Fol. 196.

18. " On the 18th and 19th, three men of His Majesty's 84th Regiment were brought into hospital, with well marked symptoms of the spasmodic cholera, slight vomiting and purging of white watery fluid; great anxiety and depression of spirits, with severe spasms of the extremities, nails black, countenance sunk and livid, eyes glassy. The usual remedies of tinc. opii and calomel with cordials were administered to the three men, soon after the attack; a strong rubifacient liniment was well rubbed over the stomach, abdomen, and extremities; while the warm bath was preparing, into which the patients were afterwards placed for five minutes, then taken out, well dried, and placed on their cots, and covered with blankets. The spasms which were severe at the commencement, continued, but with less violence after being put into bed; the heat left the external parts and the extremities, and was succeeded rapidly by cold clammy sweats; the pulse barely perceptible. The first or second dose of the tinc. opii and calomel generally relieved the vomiting and purging; cordial medicines with warm wine, spirits, and water were given occasionally, but all without the smallest good effect, as the heat by all these means could not be restored to the surface and extremities, and these three patients died exhausted, soon after; blisters were likewise early applied over the stomach in all these men, and an injection with laudanum in conjee-water, which was retained."

P. S. " I have just seen five men of the 84th Regiment brought into the hospital with the spasmodic cholera, all of them were immediately bled, and a cordial draught given them of aromatic spirits

of ammonia in camphor mixture, four of them are now asleep with the pulse full and equal. The fifth man is in a restless and doubtful state, having been ill for some hours; no more than 14 ounces of blood could be taken from both arms, dark and thick; his skin is cold, his face sunk and livid, the pulse not perceptible, and he has the appearance of a person labouring under epilepsy, apoplexy, or strangulation. His restlessness prevented the application of leeches; a cordial mixture with tinct. opii was frequently given to induce sleep, which is the first symptom of recovery." In an after report the same gentleman observes—"There has been no admission with cholera in the European hospitals for seven days past, and the last cases admitted were of a milder form, free from spasms, and did not require bleeding."

Supg. Surgeon Duncan. Fol. 110.

19. "I am extremely happy to have it in my power to bear testimony in the strongest terms to the efficacy of the bleeding system of treatment.—In four cases I have seen it fail; but in them all, the more severe symptoms had continued from 5 to 13 hours before admission. In 32 others, I have seen it followed by rapid cures, and in 15 of these the second stage had commenced. In none have I seen it fail, when applied before, or soon after the commencement of that stage. One of the above cases was a native, and it was one of the most strongly marked in favour of the practice. The same system has also been pursued to some extent in the natives by Mr. Owen, garrison sur-

geon here, and with great success. Dreadful as this disease is when neglected, happily it seldom fails, like the rattle-snake, to give us a salutary warning of its approach ; it is an object of greater importance in practice, than any other, that these warning symptoms should be generally known, and attended to ; and in order to impress them more strongly on the memory, I will be guilty of repetition ; they are as follows. In almost every case giddiness ; in many head-ache ; in almost all a sense of anxiety, lassitude, and debility. The skin is moist, and colder than usual to the hand of another. The pulse usually accelerated, and weakened ; there is usually sickness, and anxiety at the stomach ; and the bowels are griped, with loose stools ; if these symptoms are neglected, those more peculiar to the disease, sooner or later are sure to set in ; thirst, burning pain at the stomach, vomiting, continued purging, and spasms. If the remedies are still not applied, the pulse sinks so as scarcely to be felt, and the patient tosses about in a dreadful state of anxiety. After this, in three out of four cases, the disease has gained such ground as to mock all human efforts ; and though I have seen bleeding succeed in several cases nearly as far gone as this, in two others it appeared to hasten the catastrophe. In short it is in this case a very doubtful remedy, but as there is little hope from any other, I think it ought still to be tried, when age or laxity of habit do not forbid it. The violence of the spasms will be found a useful criterion in this part of practice. They are found to prevail most in robust and full habits, and to mark the rigid fibre which best bears, and is most bene-

fited by blood-letting. The recumbent posture should be invariably preserved in cholera, unless we wish to bring on syncope from bleeding, for a very little experience teaches us, that the opposite one greatly increases the debility."

Mr. Orton, Fol. 117.

In a report four years afterwards, the same writer observes,—“ Our experience with regard to bleeding has been rather unfavourable to it, in the more common, and severe form of the disease; that is, when there is great debility of the circulation, coldness and paleness of the surface. In several cases where it was tried, it was followed by irretrievable sinking. But in a numerous class of cases where there was considerable appearance of increased action, as flushing of the face, temperature rather above, or not below natural, and often severe spasms, though the pulse in some of them was small and contracted, bleeding was attended with the best effects.”

Fol. 120.

20. “ The two first cases were slight, and yielded easily to laudanum and calomel. But we had soon to observe, that with Europeans these medicines failed, though the disease was taken at the commencement, and the utmost attention paid to the treatment of it. The appearances on dissection, have been so uniform in their tendency to prove the great necessity of relieving the circulating system, and preventing that congestion, which has been in every case so apparent, that blood-letting became with me a primary object of attention. I have therefore used the lancet with some degree of

freedom, and where the disease would admit of a sufficient quantity of blood being extraeted, I have found it of the most essential serviee, in relieving spasm, and the irritability of the stomach. But how far it can be used with safety, in weak and debilitated constitutions, and old age, still remains doubtful; yet in these even, if taken with eaution, and in suffieient quantity in the first instanee, it will be found a valuable auxiliary. I have taken 20 ounces of blood from the arm of a delieate native woman, with the happiest effect, where the spasms were very violent; nothing more being required afterwards, than a dose of calomel and rhubarb to open the bowels. I am happy to say, that I have not lost one patient who has been bled, or at least when the blood would flow in a moderate degree, so as to relieve the most urgent symptoms."

Mr. Owen. Fol. 122.

21. " In recent eases, where the patient has reported himself early with the usual symptoms, of giddiness, and a burning sensation at the serobie. cordis, with retching, vomiting, and purging; the latter is generally slight, and most particuarly with spasms—blood-letting is attended with the most benefieial and immediate effects in alleviating those urgent symptoms, administering a cordial draught with tinct. opii, applying a blister to the epigastrie region; after which the patient falls into a sound sleep, which continues for several hours, then calomel may be given with the best effects; afterwards an aperient draught, assisted by quickly stimulating injections; but where there is coldness and clammy

sweats, with want of circulation in the extremities, and lividness of surface, I fear blood-letting is a doubtful remedy ; indeed in this stage blood will not flow by any means, yet it is the remedy that the appearances on dissection point out as likely to be useful, could it be extracted in sufficient quantity. I may here express my doubts respecting cordials, the warm bath, &c., although freely used in this stage of the disease, yet they did not answer our expectations.—The symptoms are extremely various, the primary are vertigo, a sense of langour succeeded by cold perspiration, uneasiness at stomach, griping, with slight watery purging mixed with white mucus ; vomiting, or retching ; or without any purging, and frequently without spasms. When a patient reports himself early with these symptoms, he may be soon relieved ; from my limited observations on the disease as it appeared in this place, blood-letting is only applicable, in the most of instances, in cases of spasm, (but not of any standing,) that is, when there is no coldness or lividness already taken place.”

Mr. Maclaine, 122.

22. “ Mercurial frictions were tried in some cases, and apparently with great benefit. Blood-letting was tried in two cases and they both recovered.”

Dr. Wight. Fol. 156.

23. “ As the detachment consisted of stout young men from the flank companies of the 20th Regiment N. I., I found the happiest effects from bleeding

eopiously in the first instance, removing the spasm, and quieting the irritability of the stomach; thus enabling me to exhibit remedies internally, without any fear of rejection."

Mr. Turnbull. Fol. 167.

24. " All the reports which have hitherto been published upon the treatment of cholera, exemplify very strongly the utility of bleeding in the earliest stage of the disease: but it is also observable, that this remedy has been had recourse to in all, even its most opposite stages. In reading the Bombay Report (excellent as it is, in illustrating the good effect of bleeding in the first stage) especially does this become apparent; patients, in the indiscriminate use of this practice, are bled both at a time when the pulse is scarcely operated on by the disease, and also in the latter stage of the malady; when, from the almost total absence of the circulation, blood scarcely can be drawn. The effect of bleeding in the first instance, does in almost every case, appear to be marked with a most decidedly beneficial result; and even where recovery has not been the consequence, a retardation of the last symptoms of the disease has certainly been obtained, but whilst on the one hand in the first stage of spasmodic cholera, bleeding appears to be thus beneficial; it is no less evident, that the use of this remedy in the latter stage, is almost uniformly attended with that result, than which no other could be expected. The limited opportunity I have had, in comparison with many others, of putting the practice of bleeding into execution, certainly does

not warrant, in itself, the above observation ; it has however been the result of the little experience I have had ; it is to be observed by the perusal of all the reports upon the subject, and is an inference fairly to be deduced, from every analogy which bears upon it.”

Mr. Chapin. Fol. 194.

25. “In many of the cases, even of those which terminated fatally, there was neither vomiting nor purging, nor spasms ; and in some of them even to the last moment of their existence, there was not a complaint of any kind, except an appalling consciousness of immediately approaching dissolution. In all those cases, however, the most important, and perhaps the most peculiar symptom of the disease was present, the circulation was arrested, and they had besides, all of them, exactly the appearance of a body drowned, and just taken out of the water. My experience in the epidemic has not been sufficiently varied and extensive to induce me to say much upon the treatment of this disease, but I must not omit mentioning, on the one hand, that no case proved fatal, in which two pounds of blood were obtained from the arm ; and on the other hand, that after the disease had proceeded to a certain stage, medicine, whether external or internal, had no more effect than it would have had upon a dead body.”

Dr. Pollok. Fol. 225.

26. “In forwarding these 27 cases of spasmodic cholera, which were received, and treated in the Garrison hospital during the months of May and

June, I feel it but justice to myself to state, that in all those cases which terminated fatally, with the exception of one man, the patients were past the power of human art, when received into hospital ; none had been ill less than 5 or 6 hours, and many 8 or 10, before I saw them.—All the means, however, within my reach were tried, the vapor bath, friction with spirits, stimulants, antispasmodics, &c. &c. but without effect ; and I confess it was a matter of deep distress to me, to see so many men sent into hospital to die. It has given me however the opportunity of examining the bodies after death ; and those examinations have led me to a practice, which, I am happy to add, has been attended with the best success. I have succeeded almost in every instance by bleeding, where it could be practised ; but I doubt much whether blood can be drawn after the patient has been ill more than two hours ; the grand object therefore is to attack the disease at as early a period as possible, and if bleeding is had recourse to within one hour, I should entertain a very sanguine hope of success. Let me not however be misunderstood, by supposing that I intend to say, I have succeeded alone by bleeding, without other aids, I merely wish to state, that bleeding in the early stage removes spasms, prevents venous congestion, and gives that salutary check to the progress of the disease, which enables us to treat it ; and here it may not be improper to observe, that after the debilitating symptoms of cholera are checked by bleeding, a re-action frequently takes place ; to overcome which requires the greatest attention.—In every case venous congestion was manifest, and appears to have been the immediate

cause of death. In short, from the examination of 14 cases, all which were in their leading features alike, there is a complete stagnation of blood in the veins, the removal of which seems to me to be the principal indication of cure."

Mr. Ammesley. Fol. 278.

27. "On transmitting to the Medical Board, the preceding cases, among which there are a few of the epidemic and spasmodic cholera, I beg to give my testimony in favour of bleeding in the treatment of that very fatal disease.—So far as my experience enables me to form an opinion, bleeding, early and copious bleeding, is the only means of cure yet discovered on which any reliance should be placed. The total of cases of spasmodic cholera, which have occurred in the 89th regiment up to this date, does not exceed eleven; of that number five have died, and six have recovered; of those who have recovered, all, except one were bled copiously, that is to say to 50 or 60 ounces. In those who died either bleeding was not had recourse to, or delayed till too late, and when none or very little blood could be made to flow from the incised veins. In the cases successfully treated by bleeding, it was remarked, that the pulse though feeble and intermitting, when the vein was opened, became stronger and more equal in its pulsations as the blood flowed; the patients also expressed their receiving the greatest relief from the remedy. In two cases the pulse, about 20 or 30 minutes after the first bleeding (which was to the extent of 32 ounces) began to sink again, and to intermit, and the cold perspira-

tion, and indiscrivable anxiety peculiar to the complaint to return. The vein was in both cases again opened, and greater relief was discovered from the second abstraction of blood than the first, an equal or even larger quantity being lost by the second than by the first bleeding. From the power which large doses of calomel certainly possess of allaying an ordinate action of the stomach, and more especially of the alimentary canal, I am of opinion that its use should never be neglected, but I have seen enough to convince me, that whether given alone, or in conjunction with laudanum, or spirituous and stimulant preparations, it is quite unequal to effect recovery, in the great majority of cases. The propriety indeed of giving stimulant and spirituous medicines, would seem rather questionable if we consider, that in by far the greater number of cases of spasmodic cholera, there exists more or less of inflammation, and superficial ulceration of the stomach or duodenum, or both. In every case of recovery from spasmodic cholera, a state of reaction has followed the asthenic state, in which there was generally a redundancy of bile, and to my mind, this fact appears to countenance the opinion, that there exists an affinity between the two diseases, viz. The epidemic and cholera morbus."

Dr. Daun. Fol. 272.

SECTION III.

28. "I had been informed that emetics had been used in the spasmodic cholera with advantage, and I gave them a trial, the result of which was very

satisfactory, the solution of tartris antimonii, two grains in an ounce of water, was given in half ounce doses every half hour, till free vomiting was produced, and it was encouraged by copious draughts of warm water. The whitish watery matter was at first ejected from the stomach, but the operation of the emetic being promoted, some bile was brought off; and the stools, which had continued whitish and watery, gradually assumed a bilious, or rather, a more natural appearance, and a better consistence. As a strong determination takes place to the surface from the operation of the emetic, it thereby produced very beneficial effects; in the body, and particularly the extremities, which had felt cold and chilly, the circulation and natural heat were soon restored; and the pulse, which had been very feeble, or scarcely perceptible, became regular and distinct. With the view also of encouraging the natural heat, fomentations and stimulating applications to the feet were used; and, if there was pain in the epigastrium, a blister was applied. When the patient felt relieved after the operation of the emetic, the solution was repeated in smaller doses every hour to produce a constant nausea, and keep up the determination to the surface; it also produced some loose stools; small nauseating doses were continued for several hours, until the unfavorable symptoms had disappeared. The following morning a purgative was given, of jalap and calomel, or salts and senna, which produced several loose and natural stools; and the patient felt free from complaint, except weakness. Fourteen patients were treated in the manner I have described; of these, three have been discharged, two have died,

and nine are recovering favorably. The two unfavorable cases were admitted in an advanced stage, and were much exhausted."

Mr. Neilson. Fol. 96.

29. "In the Bombay report, published by the authority of the government, and recommendation of the Medical Board of that presidency, I observed that emetics had been very successfully used in the treatment of cholera. Being scrupulous in making a trial of the remedy, I have only done so in a few cases which were in a hopeless state, and which had resisted all those remedies which are usually prescribed. I have used this remedy in four cases of this kind; two of which proved fatal, and two recovered; three of these patients were camp followers, and the fourth was the barraek conicopoly; the latter suffered severely from the spasmodic cholera, for the relief of which, he was bled copiously, took opium in various ways, and made use of all the other contingent remedies, which are usually prescribed; on the eighth hour of his disease, he was visited with the majority of those symptoms which are indicative of a speedy and fatal termination: at this period I totally despaired of his recovery, when I commenced, and continued giving him a third of a grain of tartarized antimony every fifth minute, with large draughts of warm milk, until it had some sensible effect on the stomach, which it very apparently had, in the period of forty minutes; when he experienced considerable nausea, accompanied with occasional vomiting. I then discontinued the use of the tartarized antimony,

and ordered a continuance of the milk. In the period of an hour the system presented a favorable change; the cadaverous aspect, and collapsed state of the countenance, which previously prevailed, gradually disappeared, and the patient progressively recovered. The other case which terminated favorably very much resembled this, and the treatment was similar, with the exception of the exhibition of milk; in lieu of which, thin meat broth was given. In the two cases which terminated fatally, the patients survived the attacks much longer than ordinary. I have given emetics in some cases which had a few of the precursory symptoms of the cholera, (and which would most probably have led to this disease if they had not been checked,) with perfect success.” Mr. England. Fol. 179.

Emetics successful, and good effects of a solution of the sulphate of magnesia or soda, where burning heat of the stomach prevails.

30. “At an early and severe period of the prevalence of the disease, when neither the number of cases, nor the severity of the symptoms indicated a milder form, the tartrate of antimony was had recourse to; I must confess it was with diffidence, and some degree of anxiety and fear I had recourse to a medicine known to act as a powerful emetic, and in a disease where constant vomiting is so prominent a symptom, accordingly, I used it in the first two or three instances, in doses of one grain with five grains of calomel; its effects emboldened me, and I had it given in doses of two or three grains.

One of the first effects of the tartrite of antimony, and what I look on as an important one, was, in almost all cases bringing off the ingesta, which had been retained, though the vomiting of eongee like water had been previously urgent and frequent; 10 or 15 minutes after the ingesta were thrown up, after waiting to see if the stomach was emptied of them, a second dose was administered. Every means of keeping the patients well covered now were strictly adhered to, to cause the tartrite of antimony to act on the skin. The dose was repeated every hour, or two hours, according to the urgency of the case. When the patients could be kept steadily covered, the first favourable symptoms were, a slight degree of heat about the shoulders, which gradually and slowly extended downwards; the countenance lost its collapsed and ghastly look, and the pulse began to be indistinctly felt, and the cold clammy sweats wore off. When the patients complained of thirst, which in a great many cases was incessant, a weak solution of sulphas sodæ, or sulphas magnesiæ was given, generally a spoonful at a time; this afforded them much relief, and the patients expressed their feelings both in their looks and actions; even in the cases where the burning heat of the stomach was present, the saline solution was given with relief; when cautiously given in small doses it scarcely ever caused vomiting; in some few cases, I gave it in larger quantities, at the continued and urgent entreaties of the patients; but it always excited vomiting when given in an overdose, or too frequently administered. I am so convinced of the utility of

tartris antimonii in this prevailing disease, that, I would give it a preference in my own case, were I unfortunate enough to be attacked by it. After giving it a fair trial, I informed the officers of the corps of its efficacy, and several of them used it among their servants and followers, and agreed with me in its efficacy, and superiority at that time, over stimulants. From what I have said of suspected inflammation in the stomach, it may be asked, why I had not recourse to bleeding more frequently. The few cases wherein that depletion was used, all terminated fatally, though had recourse to, when it promised to be successful, being used at an early period of attack. Lieutenant Campbell was a very powerful man, of a plethoric habit, and who led a very regular life, on whom the effects of blood-letting were tried at a tolerably early period, when the vascular system did not appear materially affected. The blood was drawn from a large orifice, and flowed in a full stream until it changed from a dark to a florid colour; when upwards of 10 ounces were drawn, deliquum animi came on, yet his case terminated fatally. The following short statement will show, the proportion of deaths under the two different treatments; from the 9th to the 15th inclusive, the number of admissions amounted to 34, within that period, the stimulating and antispasmodic medicines were used; out of that number, and under that treatment, 18 died. The tartrite of antimony was then had recourse to, from the 16th to the 30th, the number of cases amounted to 133, of which 46 proved fatal; so that the number of casualties decreased from more than half, to about a third."

Mr. Barton. Fol. 208.

Emetics practiced by the Natives.

31. “ The natives of this country, among whom the disease is by no means unknown, are in the habit of giving to those affected with it, a strong solution of common salt in water ; some give the following mixture, one picc weight of onion juice, and two picc weight of arrack ; both these have violently emetic effects, but they say they are very successful in treating it in that manner. After leaving Mhow, I gave to one or two slight cases tartar emetic with certainly good effect ; by determining to the surface, it quickly restored pulse and heat, and it might I think, combined with opium, be used with advantage, I have not however had opportunities of trying it sufficient to enable me to do more than conjecture.”

Mr. Wilson. Fol. 92.

32. “ A Sepoy came to hospital about 6 o'clock in the evening ; he had been vomited, but not purged ; was cold, faint, and without pulse, features contracted and eyes sunk. He vomited a frothy fluid, with a good deal of straining ; the whole of the muscles usually engaged in the operation were so at that time, but not that convulsive effort of the stomach so commonly seen in cholera ; he took 3 grains of tartar emetic dissolved in a little water, which operated well, nothing particular was discharged from the stomach ; the skin afterwards became hot, and the pulse rose ; next day, there was a little febrile irritation of the system, hot dry skin, pulse moderately full, pain in the head, and

bowels costive ; took 3 grs. of calomel with 15 of rhubarb, and had an injection in the evening as the evacuations were not free.—14th, is free from disease, but complains of weakness, and has a sore mouth ; his mouth continued sore for some days, which was attributed to calomel.”

Mr. Stokes. Fol. 214.

33. “ Mr. Boyle of H. M. ship Minden, has published a treatise on the cholera, advocating the emetic treatment.—The indications held in view by Mr. Boyle in resorting to the practice, were, removing obstruction of the biliary ducts, (which he looks upon as a source of irritation to the nervous system) ; increasing the secretive function of the liver, and the evacuation of bile.

SECTION IV.

34. “ The rapidity with which this disease runs its course, terminating fatally in some instances in five or six hours, gives no room for delay in its treatment ; in which I was guided by the account of the mode used by Mr. Corbyn, and published by that gentleman. The success which had attended it in his hands, and the circumstance, of the few cases which had occurred in this force about a month and a half before, amounting to 19 or 20, having all of them readily yielded to it, gave me

great confidence in it ; and in the manner alluded to, with the addition of the use of the hot bath, were all my patients at first treated. I soon found however, that my expectations of equal success were to be disappointed. I have in almost every case found not much difficulty in checking the vomiting and purging, but the patients uniformly sunk into a state of stupor, with frequent and violent spasms, and the greatest exertions were afterwards necessary to recover them from it ; the means I used for that purpose, were, hot baths, stimulating frictions, and blisters ; and internally, strong stimulants very frequently repeated, till the pulse became perceptible at the wrist ; and continued at longer and longer intervals, till the surface regained heat, and the pulse strength ; that once accomplished, the natural expression returned to the eyes, and the bowels being freely opened by means of large doses of calomel, to excite the action of the liver (which I gave freely from the commencement of the disease) and inf. sennæ c. sulphat. magnes. or ol. ricini, the patient was out of danger. As a stimulant internally, I gave, having no other to administer, six grains of camphor suspended in warmish water, sometimes with, at others without oil of peppermint, every quarter of an hour, till the circulation was in some degree restored to the extremities, and heat to the surface ; and then gradually diminished the dose, and lengthened the intervals at which it was taken, till it could with safety be discontinued ; tincture of opium I used as sparingly as possible, as I imagined, that it had an immediate tendency to induce the fearful degree of

torpor which comes on, and indeed at first, I feared that it was in a great degree the cause of it, though that is not the case. I have no doubt that from the very large quantities in which it is exhibited, it very greatly increases the above-mentioned symptom, which I have always found to be the most formidable one in the disease. The following will shew the result of the mode of treatment I followed from the 16th to the 21st of July; taken ill 195; died 25; recovered 170." Mr. Wilson. Fol. 19.

35. " In this disease the indications of cure were obvious, to those patients who had the burning sensation about the stomach, magnesia with calomel was exhibited in repeated doses, until the desired effect was produced, when purgatives were given: of these I found the neutral salts, alone, and in combination with senna, and the oleum ricini, the most useful; if the evacuations were not changed in appearance after the first dose of physic, calomel, in combination with the pulvis antimonialis was exhibited, every three or four hours, with a laxative every morning, until the constriction of the extreme vessels, and the biliary organs yielded; when a flow of most brilliant yellow bile, scalding in its passage, succeeded. Bitters and laxatives were then used as required. In many cases, where there was much acidity in the prima viæ, the evacuations changed after the first dose of magnesia and calomel, and a single purgative finished the cure. In many, where the presence of acid was not so obvious, the treatment was commenced, by a large dose of ipecacuanha." Mr. Campbell. Fol. 220.

36. " Although I considered checking the vomiting as the first, and most essential object, I yet found my patients not materially improved, till the purgative had taken its full effect. In the fatal cases the bowels were obstinately costive, except the watery evacuations mentioned as a symptom of the disease, and I lost no one, whose bowels were well evacuated." Mr. Bueke. Fol. 124.

37. " The first case was a Sepoy of the 21st Regiment, who complained of pain in his bowels, with costiveness, a dose of castor oil was prescribed, and this having no effect, a second of two ounces was given, which seemed to aggravate his distress, inducing swelling of the abdomen, with excessive pain, cramps of both the upper and lower extremities now made their appearance, with a sinking of the pulse, and cold perspiration.—I was then convinced that the disease was cholera, when strong purgative glysters, and the warm bath at last relieved him; and by giving repeated doses of the croton pill, free purging came on, when the man immediately got well." Mr. Connel. Fol. 125.

38. " Mr. Henderson's treatment of cholera. Extracted from the Edinburgh Medical and Physical Journal, No. 88.

" The patient being confined on his back with his head low, one ounce and a half of castor oil to be given, and one ounce to be repeated every 20 minutes till freely purged, the patient to be kept on his back by force, and not allowed the slightest

motion, till the operation of the oil ; should vomiting take place, a few drops of laudanum may be added to the oil, but the less the better : stimulants may be given after two hours, when it is supposed the oil will have passed the small intestines, which are supposed to contain a poison, and thus it is said, the favorable symptoms become apparent before evacuations are produced by the oil."

39. "A Gunner, aged 28, of robust habit, admitted into hospital 22d of April, with a slight affection of the chest, which was relieved by the application of leeches and purgatives : on the 25th he was convalescent. 26th, 8 A.M. attacked with general debility, a considerable degree of coldness, and a profuse clammy perspiration all over him ; pulse feeble, pain in the head and vertigo ; tongue moist, but rather furred, no stool since yesterday, he feels extremely sick at stomach, but has had no vomiting or spasms ; says that he felt well till 6 o'clock, when he walked outside the ward, and was obliged to return immediately, in consequence of a considerable degree of weakness attacking him, and he felt no other alteration till this moment, when the above symptoms seized him ; his eyes are sunk and his countenance collapsed, with a good deal of anxiety about him.

R mist. camph. ℥iss. æther. vit. ʒss. ol. menth. ppt. gtt. x.
 ℥ ft. haust. stat.—habeat enema purg. stat.—appl.
 hirud. viij. utrique temp.

warm flannels to be applied to his chest and extremities, and to be well covered up with cumlies ; in twenty minutes, his skin was quite warm, his pulse

80, and pretty firm, passed a copious feculent stool, has taken a cup of tea, and feels considerably relieved.—4 p. m. has had one copious stool of a light brown colour, no vomiting or spasms, pulse 56, rather small, skin natural; complains of pain and lightness of his head, tongue moist, no thirst; took some soup for his dinner; his countenance and the appearance of his eyes are more natural.

Rept. hirud. viij. utrique temp.—℞ calom. ʒj. opii. gr. ii.
ft. pil. stat.—habeat potu acid. nitric. ad libitum.

27th, pain relieved by the leeches, but still has some lightness of the head, griped considerably but had no stool in the night, tongue moist, pulse 64, and pretty warm, skin of natural heat, no thirst.

℞ mist. purg. ʒiij. tinct. cardam. ʒss. m stat. sum.—
habeat enema purg. quam primum.—sago for dinner."

Was freely purged, the bowels after this being kept open, and the leeches once more applied to the temples, he was convalescent on the 30th.

Mr. Annesley. Fol. 274.

Observations on Opium.—Very successful practice by bleeding and purging, with judicious remarks on stimulants.

40. "The cholera morbus, that has created so much interest and alarm, and committed such vast havoc over the greater part of India of late, at last made its appearance among the men of the corps: on the 16th, and on the two days after, it raged with great violence, and deplorable mortality; the first patients admitted, were treated according to the plan laid down in Dr. Corbyn's letter, of the Bengal establishment, with calomel and tinct. opii, repeated

as symptoms indicated ; the first dose was in many cases rejected, but the second seldom failed to set on the stomach, and lay the inordinate gastric irritability, and lessen the purging ; but it proved such a powerful sedative in most cases, that the patient soon after swallowing the potion, fell into a comatose state, from which he could not be roused by the most powerful stimulants, administered freely, both internally and externally : from this circumstance, and my success falling far short of what I was led to suppose, from that conveyed in the letter before alluded to, and considering the mischief to arise in some degree from an over sedative dose, I determined to abandon the practice in a certain degree ; and looking on the disease in some way connected with a want of action in the hepatic system, and an overcharge of blood in the internal circulation, from its being repelled from the surface on the internal organs, owing to something perhaps peculiar in the atmosphere ; and from the known sympathy that exists between the liver, brain, stomach, and skin, it may in some manner account for the antecedent and subsequent symptoms ; from this view of the disease, I considered it of an inflammatory spasmodic nature, and bleeding being the best, or rather chief remedy in such complaints, as at once lessening spasmodic action, allaying gastric irritability, relieving the heart and circulating system, and warding off inflammation and its bad consequences ; especially when the disease was in its incipient stage : I therefore resolved giving venesection a full trial, and repeating it as often as the spasms or cramps recurred ; or until the irritation of stomach was appeased ; at the same time a large

blister was applied over the region of the stomach and bowels, and after the patient had recovered a little from the bleeding, as it was always carried usque ad deliquum, ten or fifteen grains of calomel was given, mixed up in a little conjee, and washed down with a draught of the camphorated mixture ; by which means I seldom had occasion to repeat the dose, as the previous bleeding seemed to prepare the stomach for its receipt, and aid its operation in emulging the biliary ducts, and determining to the bowels, and restoring to them their balsamic bile ; as in most instances there appeared a total want, or suppression of that essential article ; and the counter-irritation produced by the blister soon allayed all gastric uneasiness, and prepared it for the receipt of any thing that symptoms indicated ; in one case only had I occasion to repeat the bleeding on account of the spasms and gastric disorder recurring : in a few cases where slight irritability of stomach continued, after free venesection, fifteen or twenty drops of laudanum were added to the camphorated draught, but I never exceeded that quantity ; and in six or seven hours after the calomel was administered, a laxative draught, composed of an infusion of senna and salts, or oil, was given, to determine to the bowels, and accelerate the operation of the calomel ; the compound powder of jalap would have been preferred, but I had none in store ; my expectation of success after adopting this line of practice was more than fulfilled, as out of twenty-eight admitted and treated in this way, I only lost two ; and both were rather unfavorable cases on admission, from their not applying until the disease was far advanced, and pulse imperceptible ; how-

ever, it relieved their sufferings, and prolonged their lives for a longer period than those treated in the other manner, as one lived fifty hours, and the other nineteen ; whereas, the others all died within fourteen hours after they were received into hospital ; from which circumstance, I am inclined to think, that unless venesection is early and freely performed, the chances are unfavorable ; but when employed in the incipient stage of the disease, before the inflammation has run high, and while the pulse can be felt, it promises almost sure success. I had almost omitted to mention, that emollient clysters were frequently given, and embrocations applied to the abdomen to assist in taking off stricture ; and restoring a healthy secretion from the intestines ; as the physie had due effect, the burning heat in the stomach and bowels abated, and the patient was allowed to drink small quantities of warm conjee ; but cold water, which was urgently desired—was strictly prohibited, as it seldom failed to bring on a recurrence of the symptoms, if indulged in before twenty-four hours had elapsed ; as auxiliary remedies, the hot bath, stimulant and anodyne frictions, blisters to the head, and sinapisms to the feet. Cordials and the more powerful stimuli were only administered, where great exhaustion and loss of vital energy existed, as in several cases, I attribute unfavorable results, to too free and early a use of cordials and stimulants ; and in no case where they were not given, have I had occasion to repent it, as I have seen many more recover, of whom I could entertain but little or no hope, without ; than with the free and repeated use of cordials and stimulants ; and even in those cases, where extreme lowness

approaching to death took place, I aseribe more suecess to external stimulants, frietions, and clysters frequently répeated, than to the other plan ; and I trusted entirely to diluents given internally, as con-jée, &c. I considered it always a point of great importance, to proeure some alvine discharge as soon as possible, for until the bowels were freely opened, I did not eonsider my patient out of danger ; and the moment any thing like natural stools were rendered, I looked on my patient as out of all danger ; the first stools were generally of a blaek gelatinous appearance and fetid ; then of a greenish hue, and afterwards they beecame of a natural appearance ; and the patients then as rapidly reecovered as they were attacked ; a good deal of nieety in praetice was necessary to guide the patient through this intricate passage, being often in that state of disease, that requires rather to be led than driven ; when the bowels remained in this deranged state, small doses of ealomel were given morning and evening, and a laxative draught of oil, or salts and senna, occasionally, to prevent any morbid accumulation."

Mr. Boyd. Fol. 96.

41. " Case of Superintending Surgeon *Rogers*, drawn up *by himself*.—Taken ill 12th June, 1822, at Masulipatam, ætat. 47, constitution robust, 25 years residence in India.—June 12th, 2 P. M. Was suddenly seized at his garden-house in the pettah, with oppressive nausea, followed by copious vomiting of a glairy, whitish fluid, among which was mixed some undigested food. Nearly at the same instant, brisk purging eommenced, the first evacu-

ation consisting entirely of bright yellow coloured bile, but the second and third, (after an interval of a few minutes,) assumed the appearance of turbid water, or congee, passing out of the bowels with great force, in jets, as if squirted from a syringe. Slight griping preceded each evacuation, but there was no tenesmus, nor any spasms felt, either in the muscles of the abdomen, or extremities. Considerable depression of strength was experienced; the respiration, which at first was deep and anxious, became freer, soon after the vomiting, and a general warm moisture pervaded the surface. The pulse beat irregularly, and slower than natural, and the subcutaneous veins were collapsed. The face was pale, and the countenance dejected, resembling those of a person in typhus fever, but the mental powers were in no wise obscured. The feelings of the patient at once suggested that the present was an attack of the epidemic cholera, which was fully confirmed on the arrival of Mr. Assistant Surgeon Paterson, whose professional aid became immediately available, and who at this crisis concurred in the necessity of adopting the most vigorous and energetic practice to avert the immediate danger of this horrible disease.—The following prescriptions were accordingly duly and successfully administered.

R Tinct. opii, spts. ammon. comp. aa gtt. 1, spt. gallic.
 (brandy dicto) ℥i. ℥ft. haustus statim sumendus et
 rept. pro re nata, mittr. sanguis e brachio magno orificio, add ℥xxx, vel usque ad syncope—applicet. empl.
 lyttæ epigastric.

The first antispasmodic draught was retained on the stomach for 10 minutes, or until the conclusion of

the blood-letting, when a tendency to syncope coming on, violent vomiting and purging, but without any pain, recommenced simultaneously; the same watery fluid was discharged. The draughts were repeated a second and third time, during the short intervals of vomiting, the purging having entirely ceased within the first half hour. 3 P. M. During the abstraction of the blood, the pulse gradually became quicker, fuller, and more regular, the skin warmer, but the thirst now began to be intense, and the whole mouth parched and clammy; the tongue whitish; the blood flowed in a large sluggish stream, of a dark colour, and without any halitus; it coagulated almost immediately, but did not exhibit a buffed coat.—4 P. M. There has been no return of the purging, whilst the vomiting is only renewed at longer intervals; the matter ejected from the stomach, consisted chiefly, if not entirely, of the liquids drank; the debility of the system did not appear to be increased by these efforts; on the contrary, the diffusion of heat and moisture on the skin has become more general, and equable.—6 P. M. The reaction of the system became every hour more evident by the increasing quickness of the pulse, the turgescence of the veins, the flush on the face, palms of the hands, and soles of the feet; but above all by the intense sensation of thirst, which is unquenchable; every attempt to allay it, by drinking the mildest fluids failed, and invariably renewed the vomiting. There was, however, neither pain, nor burning heat felt in the region of the stomach; nor any where else in the abdomen. Cool air was eagerly desired, and immersion of the hands and feet; cold water and vinegar was peculiarly grate-

ful.—8 P. M. The blister has already begun to act as a rubifacient, and for the first time since the attack, about two ounces of urine of high colour, have been passed. The vomiting still recurs about once every hour, and is apparently excited, by the smallest quantity of liquid taken; or, by the large volume of air extricated in the stomach, occasioning as it were the mechanical stimulus of distention, an effect the more likely to happen from a spasmodic stricture on the pyloric orifice, which is suspected to exist.—Fluids swallowed produce sound like water dropped into a bladder filled with air. 10 P. M. A considerable degree of restlessness prevails, imputable to the state of reaction, of which thirst continues the most urgent, and distressing symptom.—Mr. Surgeon Dean visited the patient at this period, and highly approved of all that had been done; but very judiciously recommended a total abstinence from every kind of drink, however painful, for a certain number of hours, and to substitute rinsing the mouth frequently with lime juice and water, as the most effectual means of subduing the vomiting, depending as it seemed on excessive irritability of the stomach.—Midnight, retched only once within the last two hours, and flatus only was then discharged. The blister has excited considerable irritation, and vesications are rapidly forming; micturition; thirst and restlessness continue, but are not increased; pulse 100, and soft, skin warm, with partial moisture about the head and breast.—13th, 6 A. M. The blister has fully risen, and there has been no return of vomiting. Since midnight the flatus of the stomach has escaped in immense quantities by the bowels, affording proportionate relief.

Mild liquids such as toast and water, chicken broth, tea, can now be drank in moderation, and although the mouth is clammy, and the tongue quite covered with a viscid mucus, the thirst has sensibly abated. A few short intervals of sleep towards morning.—

7 A. M.

R. Hydrarg. submur. gr. vj. confect. aromat. ℥i. ʒ ft.
bolus, statim sumendus.

11 A. M. some nausea was experienced from the calomel bolus, but in the course of the forenoon, were produced 6 bilious though rather scanty evacuations, after which, the thirst gradually diminished, whilst liquids could be drank with greater freedom and relish.—3. P. M. The restlessness experienced during the preceding night, and former part of this day has now greatly subsided; the pulse is reduced to 90, and the skin to nearly its natural temperature, and moisture. The salivary secretion is increased, but the taste is completely vitiated by a viscid mucus covering the tongue and fauces, and the thirst is still occasionally urgent.—7 P. M. Relished a cup of ginger and green tea mixed, which was followed by free perspiration, and pleasurable sensations over the whole body.—14th. Passed a good night enjoying refreshing sleep, occasionally however, interrupted by disagreeable dreams.—9 A. M. Sat up half an hour in the chair, and breakfasted on a cup of tea, and a little toasted bread; pulse and skin natural, the thirst nearly gone, but the tongue remains whitish and furred in the centre.—2 P. M. A slight return of appetite; dined on a bason of spicy soup, which excited a warm and grateful sensation in the stomach, re-

lieving flatulency, weak brandy and water effectually quenched the remaining thirst; and a sense of extreme debility only remains.—9 P. M.

Capiat bolus calomel, gr. ij.

15th. Passed another good night; the sleep as before being only occasionally interrupted by dreams, allied to incubus.—Soon after breakfast this morning the dose of calomel produced two bilious and feculent evacuations, nearly natural in their colour, and without either griping or tenesmus.—The tongue looks much cleaner, and the sense of taste slowly revives.—Took a bason of spiced soup at noon, and at 3 some sago jelly, with wine, both of which sat light on the stomach.—Sat up in a chair for three or four hours during the day, and derived amusement from reading, the mind being cheered with the hopes of a speedy recovery.—16th. Much refreshed from the sleep enjoyed last night, diversified as it was by singular dreams; breakfasted as usual on ginger tea and toast, and at noon took 5 grs. of rhubarb in a glass of madeira—at 3 P. M. feeling a little appetite, dined on the wing of a grilled chicken. In the course of the evening the rhubarb operated mildly, and greatly relieved the flatulency of the bowels, a symptom hitherto so distressing.—17th. Slept well during the night, the dreams being less vivid, and disagreeable. As the appetite and strength improve daily, and the complexion regains a healthy colour, it is intended to adhere strictly to a light and nutritious diet, and by occasional small doses of rhubarb to restore the tone of the stomach, and to regulate the bowels until the wonted exercise can be resumed.

“ In the preceding brief history of his case, the patient has endeavoured to describe the symptoms as accurately, as he felt them acutely. There are strong reasons for believing, the epidemic cholera, to be a disease, ‘ sui generis,’ allied to the species of congestive typhus fever, recently so ably described by Dr. Armstrong in his Essay on Fever, which may be regarded, as forming a new era in medicine. The analogy is supported from an attentive consideration of the *juvantia*, and *ledentia*. In reference to the practice, in the case of the epidemic above recorded, it will be seen, that the remedies were few and energetic, and that their success, may (under Divine Providence) be ascribed, to their early application, especially the blood-letting, which might be said, to have at once cut short the disease, aided by a constitution naturally sound. The same remedies used a few hours later, might have altogether failed. The patient cannot conclude these remarks, without once more, gratefully adverting to the skill, and decision, and unremitting attention, evinced in his treatment, by Mr. Asst. Surgeon Paterson, in the early stage, and afterwards to the benefit derived from the friendly advice of Mr. Surgeon Dean.” Fol. 291.

42. “ The sudden prostration of strength, the suspension of the secretions, the absence of delirium, and all other signs of excitement; the despondency of the mind, the coldness and collapse of the skin, the irregular action of the muscular fibres, all seem to prove this defect of the nervous power. The oppressed heart, is indicated by the

faultering and sinking pulse ; the congestion of the veins of the abdominal viscera, by the sensation of præcordial stuffing, heat, weight, and often acute pain, and tension. If these views be correct, it would seem that, to remove the venal congestion, and rouse the energies of the brain, are the chief indications of cure. Venesection, early, copious, quick, is the remedy best suited to remove the former, by instantly relieving the pressure *a tergo*. Diffusive or general, and local stimulants, frictions of the skin performed by hot and dry substances, seem best adapted to the other. In all cases where I could get the blood to flow, its abstraction gave sudden relief, particularly to the præcordial oppression, and revived the pulse. I cannot say that I observed any sudden good effects from large doses of calomel ; but think it useful as an auxiliary, in conducing to equalize the circulation, and renew the secretions. I have seen injurious effects from excessive doses of laudanum ; viz. a most distressing increase of thirst, and jactitation, but in guardedly moderate doses, it must be useful as a diffusive stimulant, anti-irritative and powerful anti-spasmodic, particularly after bleeding. After removing the first most pressing danger, by prompt and decisive measures as above, I have not found it difficult to complete the cure ; in effecting which, my attention has been directed towards the restoration of the natural secretions, and excretions, alvine and urinary.”

Mr. Wyse. Fol. 231.

SECTION V.

43. "A Sepoy, æt. 24, 27th February, 1827, was brought into hospital at 7 A. M. complaining of having had 6 or 7 watery stools since 4 o'clock, and vomited twice a quantity of watery fluid, with all the rice he had eaten the preceding night; excruciating spasms in his upper and lower extremities. I saw him shortly after he entered; his legs and arms were quite cold, with dry skin, pulse not perceptible at the wrist, eyes sunk in their orbits, with a glassy appearance; thirst most urgent, tongue white and dry, breath warm; he feels a twisting in his bowels before going to stool, and then only feels pain; head-ache, great prostration of strength; half a drachm of magnesia, with 2 oz. of milk was now administered, and directed to be repeated every half hour, and bags of warm sand applied to the extremities; this was repeated ten minutes afterwards, and he shortly after had a scanty flakey, milk and water-like evacuation.—9 P. M. the second dose remained on his stomach, complains of the spasms being much increased on moving about, or sitting up to take his medicine. Rept. magnesia.—10 A. M. says he is very hungry, and keeps calling out for water to drink, the spasms in his legs and arms have become more severe. Rept. magnesia.—Half-past 10, he has had no vomiting or purging since 8 o'clock, the spasms remain unabated, skin still dry. Rept. magnesia.—Half-past 11 A. M. he has been at the pan and passed about 8 ounces of the same kind of watery fluid as before; no vomiting; the palms of his

hands feel warm, with moisture on them; and his pulse is now to be felt, though very small. Rept. magnesia.—1 P. M. there is a natural warmth over every part of his body; he has been at the pan, and what he has now passed is of a much darker colour, and contains more of the mucous flakes; he voided no urine this time, but did every time before a little; still complains of urgent thirst; three cumlies to be kept over him, his face is losing the cadaverous hue, and sunken state; he is evidently better.—Half-past 1 P. M. rept. magnesia.—Half-past 3 P. M. there is an increased heat over all parts of his body, and his pulse is now more distinct, and the spasms not so violent; no stools nor vomiting, complains of pain in his throat. Rept. magnesia.”—This was continued, and he progressively recovered.

It is observed, he took in all 28 drachms of magnesia, a great part of which he rejected, and a part passed through his bowels, which from experiments made with nitric acid, “it would seem, without being chemically changed.”

Fol. 287.

44. “A native, æt. 28, of spare make, was received into hospital at about noon on the 4th April, 1821; he had been five times purged since 9 o’clock, and on his admission was so exhausted, that he could not stand without support—his countenance was dejected, the eyes were dull and glistening, the lips were pallid, and the tongue dry; the temperature of the epigastrium was rather above the natural standard; he had a slight rigor

upon him at times, and he complained of urgent thirst, and of slight spasmodic pains in the bowels, particularly before voiding a stool. He had no spasms or drawings, and scarcely any pain in the limbs; nor did it appear, that he had suffered any from the commencement of the attack. He vomited once after his arrival I was informed, and had four small watery dejections from his bowels, of a dirty white colour. The patient being exposed for a short time to the spirituous vapour bath—two scruples of magnesia in 4 oz. of milk was administered; this draught had not been taken more than eight or ten minutes, before he began to complain of great thirst, and of a return of the pain in the epigastrium, which darted downwards through the bowels; he became very restless, and in half an hour the contents of the stomach were expelled, mixed with a minute portion of the magnesia, and two or three particles of common horse gram. He now had a drachm of magnesia given to him, in the same quantity of milk as before, and he was allowed to drink pretty freely of congee water at intervals, to allay the thirst, which had rather increased. A short time afterwards, he appeared to be very restless, he looked distressed, and frequently writhed from the pain of his bowels. His sufferings were at length considerably relieved by suddenly voiding a stool; the quantity discharged was rather more than half a pint, it was perfectly watery, and abounded with mucous flocculi; some of which on a minute inspection, appeared to have a very slight tinge of red.—At half-past 1 P. M. his skin felt warm, the pulse rather stronger, and more frequent, and the forehead was bedewed with a

gentle perspiration ; took another draught of magnesia and milk, and had it again repeated after the interval of an hour. The vomiting and purging did not return, but he was much troubled with the thirst, he became slightly feverish, and complained of head-ache at about 4 o'clock, this however was of short duration ; he had a good night's rest, and after taking a little opening medicine, he felt himself pretty well, and was in the course of two days enabled to resume his usual occupation."

It is observed, " no acid appearing to be present, not any having been detected in the discharges, which I have repeatedly examined, and subjected to experiment ; the beneficial effects cannot be attributed to the neutralizing property of the magnesia : its efficacy, therefore, may probably be found to lie in the bland demulcent quality of the fluid, in which it is administered."

Dr. Scott. Fol. 57.

45. " Goorapah Sepoy, æt. 48, of weakly habit, was admitted into hospital at 10 in the forenoon of the 2d February, 1821. It appeared that he had been about two hours on duty on the main guard, from whence he was brought into hospital, in consequence of having during that time three or four times vomited, and having been as often purged—the evacuations, he says, both from the stomach and bowels, were colourless and watery ; his pulse is now weak and slow, skin below cool, but not absolutely cold ; tongue coated and moist, the interior of his mouth is cool, but his breath is warm ; eyes rather sunken in their orbits, but

pupils and external coat not unnatural in appearance; countenance expressive of anxiety; he is, however, perfectly sensible and collected; his voice is low; he is neither deaf, nor has he any singing noise in the ears; he has no pain in the head, nor in the chest or abdomen; nor any feeling of internal heat; he complains of thirst, is very restless, tossing frequently from one side to the other; and has slight cramps of the lower extremities. Two draehms of magnesia was mixed with half a pint of fresh milk, the half of which was given to him immediately, and the same quantity repeated every half hour afterwards. At noon I found him exactly in the same state as I had left him at 10—the second dose of the milk and magnesia had been rejected from his stomach soon after he had swallowed it; and after he had taken the fourth dose, about a quarter of a pint of clear water in appearance with some flakes of mucus was passed from his bowels. The milk and magnesia to be continued every half hour as before.—5 P. M. He has taken eight doses more, in all therefore twelve since admission; was purged twice, and has vomited three times since noon; the evacuations are the same as before, his skin is now damp, and more cold than in the morning; he does not however appear so restless, nor has he cramps; his pulse is not worse, but he is now deaf; he has no pain nor internal heat, but is still thirsty. The milk and magnesia to be repeated in double quantities, at intervals of an hour between each dose.—9 P. M. has taken four of the above doses since five o'clock, during which time he has once vomited; in all respects he appears much the same as before. The milk and magnesia to be

repeated as before, every hour during the night.—6 A. M. 3d February—he vomited once, at ten last night; but has neither vomited or purged since; slept pretty well at intervals during the night, skin now a little warm, and without moisture; pulse improved, no cramps, expresses a desire for food; he took eight doses of the medicine during the night.—9, A. M. skin cool, pulse 70 and weak, tongue white and moist, passed a little urine: indeed he appears and expresses himself to be quite well, but weak. Omit medicine. Allowed to take some thick congee with a little pepper-water.—4th, had yesterday morning one white thin stool, but none since; is weak, but has no other complaint.

R Hydrarg. submuriat. gr. ij. extr. colocynth. co. gr. vj.
 mft. pil. ij. 2nd. quaq. hor. sum. donec solvat. alvus.

5th—had five yellow stools yesterday, and is to day convalescent.”

“Remarks. This was as mild and favourable a case for the trial of the remedy as can well be imagined, and its successful termination, favourable to the plan of treatment; but it falls very far short of deciding the question—has milk and magnesia any curative tendency? was not the recovery alone effected by nature? or to what extent aided by the remedy? as magnesia is, I assume, perfectly inert save in conjunction with an acid, which there is no reason to suppose in the fluid expelled either from the stomach or bowels—and which I think admits of no doubt, is, nothing more nor less, than an excessive secretion from the mucous vessels of these organs—under undue excitement; and perhaps one of the efforts of nature to relieve herself, or at least one of

the curative indications, and which we have hitherto been doing very wrong in suppressing, by the administration of opium : that I am disposed to think milk alone would have done equally well, being a bland simple diluent, at the same time nutrient ; if therefore milk, perhaps demulcent fluids as conjee, arrow-root, or barley-water would be more advisable, being always procurable, which is not the case with milk, much less with magnesia ; that after all, probably the practice of Mr. Duffin at Vellore, in 1787, assisting nature's efforts with castor oil, will prove to be the most generally useful, assisted by the warm bath, calomel, blisters, and bleeding wherever there are symptoms of visceral inflammation ; which I believe is very generally the case with European subjects, and not unfrequently so with the natives." Mr. Scarle.

REMARKS BY THE AUTHOR,

ON THE SEVERAL SECTIONS.

The 1st section,—exhibits the disease under its various forms, and in different stages, and in several instances under circumstances that would appear the most favourable for the employment of the remedies resorted to—opium and stimulants ; but

under none of these as here exhibited, does the practice appear to have been in any respect beneficial; on the contrary, I believe I may with truth add, decidedly the reverse—the patients almost momentarily becoming worse, and dying in an astonishingly short period of time, when compared with others, who were otherwise treated; as the after sections evince. The calomel I make no mention of, as it could be but of little avail with the large doses of laudanum with which it was conjoined.

The appellative spasmodica, which has been annexed, to the generic name—cholera, as characteristic of the disease—is I may say, of positive injurious tendency, as it necessarily leads the practitioner to look upon the disease in the character of a spasmodic affection, and which the remarks quoted clearly evince is the case, and as a consequence almost inevitable, directs him in practice to have recourse to these remedies; which setting aside what has previously been said, a fair deduction following the perusal of the subsequent sections, must I think prove, to be of highly pernicious application.

Having established objections of no little weight to its present name, it is on the same grounds of argument that I propose the disease being denominated—congestive cholera, as in every respect appropriate, evinced by the symptoms and their explanation, the appearances noticed on dissection, but above all, the successful treatment it necessarily calls forth, as the following sections I trust will clearly prove.

Section 2d.—Incontestibly proves the utility of blood-letting, at the same time it no less clearly

points out to us, that the indications for its employment, have been but very imperfectly understood; hence its use has been restricted by some to the relief of particular symptoms, by others on the contrary, it has been recommended without limitation in every stage of the disease usque ad deliquum; with this latitude for its employment, it is impossible a remedy of such powerful operation can be resorted to without frequently producing a fatal result, indeed, such it is remarked by some of the writers has been the consequence; this cannot however happen, under the restrictions I have recommended its employment in the treatment; that it is a remedy judiciously employed, with the evidence adduced in its favour, that I think we are warranted in saying, seldom should be neglected; it is right however that I should add, that I am far from thinking it in every case indispensable, particularly if the bowels are kept free by the saline clysters; it will be well therefore to point out the symptoms more particularly rendering it necessary; these are, in the early stage, the symptoms denoting oppression of the brain—a sense of pain, stupor, or fullness in the head; the absence of vomiting and purging; oppressed breathing; stuffiness and oppression at the præcordia. In the second stage, it is indicated in a ratio with the severity of the spasms, inward burning, irritability of stomach, pain, delirium, or other symptom of excitement. In the last stage, or rather the second, bordering on this, with much caution it may be used in relief of the last mentioned symptoms, which in the early period of this stage, are present; in such cases—leeches perhaps will be the best means of abstract-

ing it. See case No. 14. In support of these views for its adoption, and in opposition to its universal practice, I would adduce case No. 3, in which neither the symptoms during life, nor the dissection after appeared to have required it being put into practice ; nor was it, but the treatment opposed to this—laudanum and stimulants was resorted to, with the two-fold intention, no doubt, of arresting the evacuations, and supporting the living powers ; but alas, the result proves how incapable these remedies are of accomplishing the latter purpose, in this disease ; for this was a case in which there did not appear any obvious contra-indication for their employment, and consequently the least objection existed to the practice, but a different result I am of opinion would have followed, had nature been a little assisted in her curative efforts, by the administration of moderate doses of calomel, following it up with rhubarb and magnesia, or castor oil, and supporting the system under their operation by warm and gently stimulating fluids ; at the same time keeping the patient in the recumbent posture, and warm ; or with the latter precautions perhaps, the milk and magnesia would have been quite adequate to the cure ; but the latter is a practice not to be advised, as being too inefficient to be in any case relied upon, that the cases exhibited in the 5th section are rather adduced in opposition to the opium and stimulant plan, than to encourage this practice ; another object of presenting these cases, has been, to discourage that hasty and intemperate practice remarked upon in the 7th chapter, as having been but too common amongst us since 1817, as they evince, that nature a little assisted is in

some cases equal to her own relief. In further proof of which I can not only speak from professional experience, but personal; in the year 1819, I accompanied a detachment of invalids from Trichinopoly to Poonamallee, on route to which place we arrived at a village where cholera was prevailing, and several of the men became the subjects of it; on the following morning I rose at day light, with the intention of proceeding on with the detachment, and as far as my feelings were concerned was perfectly well; I had dressed, and was on the point of leaving my tent, when I was suddenly seized with dizziness, which was almost instantly followed by a windy rumbling in my bowels, and a propensity to evacuation so urgent, that I was obliged to relieve myself on the spot, on rising up from this, I felt giddy, and my stomach qualmish; the prostration of strength was now so great, that I required the assistance of a servant to raise me up on the cot, which was at hand; when I immediately took half a wine-glassful of brandy with as much water, and was well covered up in a blanket; as soon after as it could be made, I drank a cup of hot ginger tea, remaining quiet, I perspired freely after this, and was well at noon. I thought it advisable however to be very careful of myself after this, and took at night a dose of calomel, and rhubarb in the morning. Upon the same principles, have cajeputy oil, peppermint, and the like occasionally been found successful. With respect to opium, the success which has occasionally attended its use, may be explained thus, in weak subjects, or cases, in which the quantity of the circulating fluid is much reduced by considerable watery purging, and the

congestion of the brain and spine in consequence very inconsiderable; opium by arresting irritation, further purging, and inducing sleep, may be highly curative, and with these intentions I have already recommended it.

Case No. 15. Exhibits in a striking manner the advantage of blood-letting, the bad symptoms advancing rapidly under the opium and stimulant practice; indeed, I cannot avoid attributing these symptoms in no small degree, to the sedative and exhausting influence of these remedies, but which were most happily at once removed by the bleeding; to prove the opium had no beneficial operation I have adduced the next case, wherein the success was just as great without it, and the treatment of which is a good deal allied to what we have recommended. Cases No. 17 and 18 are exhibited not only in proof of the striking utility of the practice of blood-letting in this disease, but also in support of the opinion I have advanced, that the indications for the employment of this remedy stand immediately opposed to the administration of opium; or in the words I have expressed on this subject in the 8th chapter—"the indications for the exhibition of opium are in the inverse ratio with the necessity for depletion and other evacuants," and that they stand in the relation of remedies to each other, as it has been suggested by Mr. Richardson, in the treatment by bleeding, of the cases adduced of poisoning by opium. In the first of these cases, bleeding appears to have at once arrested the disease; but 80 drops of laudanum being now administered to the patient, a few hours afterwards—his system becoming under the full

sedative agency of this remedy, and in despite of some hours sleep, a most alarming train of symptoms ensue—decidedly more characteristic of the effects of opium, than of the disease; there were no spasms, burning heat of stomach, restlessness, or the like, but symptoms not a little allied to those detailed in Mr. Richardson's cases of poisoning by laudanum: these bad symptoms, however, as in the cases of the latter writer, immediately gave way to bleeding; but this having been carried to too great an extent, symptoms of approaching dissolution came on, strikingly analogous to those ensuing from hemorrhage, when a dose of opium and stimuli were very opportunely administered, and as in the like cases of hemorrhage, with immediate benefit. The other case 18 admits of precisely the same explanation.

Section 3d.—Evinces that emetics have proved eminently successful remedies, but it is equally clear, the practice has been specific and empirical, rather than founded upon principle; as they have been administered without discrimination in every stage and variety of the disease. One practitioner adjudging the success attending their operation, to the evacuation of bile; another, to the tendency emetics are supposed to have, in exciting the secretive function of the liver; another, to their operation in perfectly evacuating the stomach of the injesta which is supposed to be retained; another, in removing obstruction from the biliary ducts—and lastly, the remedy has been given in nauseating doses, with the intention of inducing a determination to the surface: but these specific and limited views are not those upon which the treatment of

this disease can with any prudence be confided ; in short the success that has attended the practice, I should rather attribute to the evacuation they induce, without reference to its nature ; and stimulus which their operation certainly have on the circulating system : and these are the indications with which I should recommend their employment ; but as the convulsive operation of an emetic, is not without some considerable degree of nervous exhaustion, there are times and seasons when they may be employed with great detriment ; and as such their utility is limited like all other remedies : their success I have said has been eminent, I mean in so saying, comparatively, with the practice they superseded, for of 34 cases treated by opium and stimulants, 18 died ; and of 133 by emetics but 46, the success operating in my mind as another very cogent argument against opium and stimulants ; for their effects contrastedly on the system, are as different, as light is from darkness ; that the greater success attending the use of emetics is in clear contra-indication, I should conceive, to the opium and stimulant practice ; and as corroborative of this view, it is observed, that in cases treated with emetics, although unsuccessfully, the patients survived the attacks much longer than ordinary ; implying of course, in reference to others, who were treated by the remedies this practice superceded : in short the patient's recovery in case detailed at 28, was mainly attributable, I should say, to the expulsion from the stomach of the opium, and other deleterious remedies which had been exhibited : the congestion having been previously removed by the

blood-letting. In addition to the emetic practice at 29, a saline solution is proved to have been very useful in relief of the symptoms denoting gastric inflammation; the same remedy was strongly recommended by the head of the Medical Department at Pondicherry—that these authorities, and its successful employment in my own case, warrant me, I am of opinion, in recommending it to general practice; I have directed it to be administered cold, but in so saying I do not mean its being rendered artificially so, but at the common temperature of the atmosphere.

Section 4. Purgatives—this section renders it very clear, that these remedies have not been duly appreciated; on the contrary, the aqueous purging which has been so generally present, and so frequently the first symptom complained of, having led to the inference, that the extreme languor, and depression of the powers of life were in no inconsiderable degree dependent on this symptom as a cause—a primary object of practice arising out of this view, has been, to arrest this evacuation, and to suppress the action of the bowels, as well as of the stomach: but the error of this system I think I have already rendered apparent, if not, the testimony here adduced bears ample proof in favor of the opposite practice; and exhibits purgatives in the character of a most valuable auxiliary, indeed it would be astonishing, that we should have neglected a class of remedies so strongly recommended to us, by the success attending the exhibition of castor oil, by Mr. Duffin, in the same disease of 1787, and the testimony of Mr. Anderson, and other of the

Practitioners of those days, in favor of bleeding, purging, and emetics ; but for the fact, that our minds were all pre-engaged by the opium and stimulant plan, which was promulgated by authority, on the recommendation of Mr. Corbyn, with whom it was said to have proved so eminently successful ; this public declaration in favor of the practice, necessarily led us to consider it as specific, or so nearly so, that we were hardly justified in trying any other ; with these impressions on our mind, it could scarcely be otherwise, than, that we should look upon a class of remedies, so diametrically opposite in character, with great distrust, particularly on testimony of so remote a date ; the utility, however, of these remedies, with the evidence this section offers in their favor, requires, I should think, but to be known, to restore to general practice. In concluding my remarks on this section, I have only to observe on Mr. Boyd's practice at 40, combining the principal remedies we have been remarking on, thought deserving attention, viz. Bleeding, calomel, purging, and stimulants, according to the stage of the disease, and indications presenting themselves ; and we cannot but offer him our commendations *en passant* for his very judicious remarks ; which are precisely in character with Dr. Armstrong's, in the treatment he recommends in the congestive typhus—to which the disease is certainly most intimately allied, as Dr. Rogers in his observations on his own case at 41, which is well worth reading, very justly notices ; and akin with what we have recommended in the treatment, founded upon principles, deduced from a pathological consideration

of the disease, as well as resulting from successful practice. That should the former not prove to others as satisfactory a warranty for the treatment recommended, as it has done to us, the latter I hope will, and experience I trust establish its claim to general confidence.

In conclusion, I beg to be permitted to add the following cases, treated upon the principles recommended: the two first being the cases adverted to in the body of the work,—and the last I had the treatment of before leaving India; and the third, by the gentleman who succeeded to my appointment, as Surgeon of the Artillery.

CASE *A*.

Captain A. ætat 30, thirteen years in India, of plethoric habit. At half-past 12 of the night of the 1st June, 1828—I was called up to see him, I found that he had gone to bed at 8, not feeling very well. The cause of his sending for me, was, that he had been suddenly attacked half an hour before with vomiting, when he brought up a quantity of undigested food. I ascertained afterwards, that the vomiting was preceded by a copious stool, and that he had had several watery evacuations during the day, with a sense of stuffing in the belly, and felt an unusual lassitude about him; but he thought nothing of these symptoms, further, than that he required a little medicine. His pulse was now 84,

full and strong; skin of warm temperature, his respiration was quite free, and he was perfectly exempt from pain. As his stomach still felt sick, and as he told me he thought it probable some stew he had taken at dinner might have disagreed with him—I made him drink freely of warm water, and in this way evacuated the stomach; soon after which a pill of ten grains of calomel was given, with a little hot brandy and water; and the following mixture was directed to be commenced upon two hours afterwards.

R Magnes. sulphat. ζ vi. Mag. carbon. ζ ii. Aquæ menthæ,
 ζ vii. \mathfrak{m} ft. tert. part. 2nda quaque hora sumend.

2nd.—At 6 A. M. I found he had vomited twice since my former visit; the last time immediately after swallowing the mixture, which was the second dose—and that he had had two or three scanty watery evacuations, without pain or uneasiness of any kind: here I must charge myself with great neglect, in not examining the evacuations; but as his pulse still continued good and 84, his skin of the natural warm temperature, and having it in mind that his attack was simply of indigestion—knowing him to be a rather generous liver—my attention was not drawn to the circumstance; that the following stimulating opening mixture was ordered to be substituted for the former, which I thought the peppermint might have rendered offensive to the stomach.

R. Infus. sennæ, ζ viii.—Sodæ sulph. ζ vi.—Ammon,
 subcarb. Θ i. \mathfrak{m} ft.

Of this, I directed a fourth part to be taken, alternately with a calomel pill of 4 grs., every two hours. —At 10, when I visited him again, I was astonished with the altered appearance of his countenance, which was now of a dusky hue—his eyes were sunken, and were surrounded with a livid circle, and his lips were of the same livid colour; he had no cramps, save once a little in the thigh—he had, however, a constant sense of numbness in the hands, as well as in the legs and feet, requiring persons to champoo and compress them. I found that he had vomited the first dose of the mixture, but had retained a second—which had been given not long after. I found too, that he had passed several watery evacuations—which upon now examining, at once pointed out the nature of the complaint—they being simply in appearance water, with a few mucous shreds: his pulse still continued at 84, but had materially decreased in power; and his skin was of reduced temperature. As soon as it could be procured, I washed 24 grs. of calomel into his stomach, with a couple of spoonsful of hot brandy and water; and then keeping him in the recumbent posture bled him; after the loss of about a pint of blood, he was very anxious to have his arm tied up, complaining of being faint; I therefore placed my finger over the orifice for a minute or two—during which time I gave him a little hot brandy and water, and then allowed about 8 oz. more to flow, which materially affected his pulse. Shortly afterwards, on taking a little brandy and water, he puked up a mouthful or two of muculent fluid, with some of the calomel; presently after, I

repeated the same dose of calomel, with a little brandy and water; and had a warm salt water clyster thrown up the bowels, which was repeated every half hour afterwards; his pulse still feeling subdued by the bleeding, and his skin a little damp—I gave him 30 minims of spt. ammon. arom. in an ounce of water, and continued this, alternately with the brandy and water, every ten or fifteen minutes, till the pulse improved, and in this way kept up the excitement of the system, as the pulse indicated the necessity of. A blister rendered more stimulating by besmearing the surface with 6 grs. of the oxmuriate of mercury, rubbed up on a slab with a little oil of turpentine, was also applied over the pit of the stomach.—At 12, he felt a little heaviness over the head generally; I suggested some leeches being applied, but as he objected to this, saying there was no pain, I did not think it necessary to urge their application at this time, but intended doing so, and afterwards the application of a blister, should this symptom increase, or circumstances appear to render such a step necessary; by the aid of the clysters, the bowels were kept in frequent operation, but nothing was passed but a little mucous fluid.—12 grs. of calomel was now repeated.—At 1, his pulse was much improved, but he still appeared to labour under a good deal of oppression, although he had no pain, sighing deeply, and moaning occasionally; always complaining that he wanted air, and that they did not fan him sufficiently, although two men were constantly employed with hand punkals. He now took the two pills left in the morning, containing 8 grains of

calomel ; and an hour after a dose of the purgative mixture.—2 P. M. Since one o'clock, as excitement became developed, and he felt a desire of cold water—I have allowed him an occasional wine-glassful of toast and water ; and have removed the blister, which had produced a good deal of irritation.—At 3. As his pulse was pretty good, and his skin of moderate temperature—I gave him a wine-glassful of a weak solution of Cheltenham salts, and which was repeated an hour after ; and occasional small quantities of toast and water, as he complained of much thirst.—4 P. M. At this time Mr. Johnston, whose opinion I had requested, paid him a visit, and concurred in the measures that had been pursued. He said now that he passed a little urine in the bed-pan, and had done so before, but I rather doubt this, as I requested him afterwards to make use of a tumbler, and he was repeatedly reminded of it, but none was obtained till an early hour of the following morning, when about two tea-spoonsful was collected, and an hour or two after, he passed as much as an ounce.—At 6 P. M. he was much in the same state—he now took three pills of calomel with antimonial powder and extract of colocynth.—At 8, I began to think something more was necessary, as he had made no progress since four.—I determined, therefore, on the cautious abstraction of blood, and to persevere with the calomel as a stimulus to the capillary circulation—till bilious evacuations at least were produced. A scruple of calomel being first administered, with a little brandy and water—I re-opened the vein, and allowed about 10 ounces of blood to flow gradually, carefully

watching its effect on the pulse ; the loss of this quantity, flagging the pulse a little, I gave 20 minims of spt. ammon. arom. and repeated it occasionally. An hour after, as the pulse had returned to the same state it was before the bleeding—I cautiously withdrew 8 ounces more blood.—At 10. As the anus was very painful, and he was tired of the clysters, which had been continued till now, and had always afforded relief, when he felt sick or particularly oppressed, they were discontinued ; and three more of the pills of calomel, antimony, and colocynth repeated.—At 12, a scruple of calomel was repeated.—3d. at 2 A. M. As he appeared to have made no advance, and as his pulse justified the practice, I repeated the bleeding to 10 ounces.—At 4. The pulse had decidedly improved, and he was in every respect better ; but as the evacuations continued of the same cholera character, ten grains of calomel was given, and the same repeated at 6 o'clock : when I left him, much better in every respect—his pulse 96, and of good strength, and as he requested it, a little chicken broth was allowed.—At 8. The calomel was repeated.—At 10. The chicken broth having again been given—had induced oppression of stomach, a little sickness, and general feelings of derangement.—At 12, he had quite recovered this, having taken an hour before ten grains more calomel.—At 11. For the first time, he passed a small green muculent evacuation, his evacuations hitherto having continued colourless, in short nothing but serum, with some mucous flakes interspersed ; the latter however had much increased in quantity

since morning. Up to this period, he took nothing but the toast and water, with the exception of the broth before mentioned—and occasionally a little brandy and water, when he felt, which he sometimes did—a sense of weakness come over him: at which times his countenance would become dark, and lips livid.—At 4 P. M. I found that he had had several dark green muculent evacuations since my former visit—and had passed urine freely, and had dozed occasionally, for short periods: the calomel was repeated.—At 8. He was better in every respect, he had had three or four evacuations, and had slept for three quarters of an hour at a time—ten grains of calomel was repeated, and the same dose directed again to be given at day-light.—4th, at 6 A. M. I found he had had a tolerable night, sleeping at intervals; and that he had had many scanty dark bilious evacuations, his urine was abundant, his pulse 84, moderately strong and full, his skin of natural temperature, and feelings comfortable; the calomel ordered last night had been given at 5 o'clock.—four grains of calomel with two of aloes, were now ordered to be given every three hours.—At 10. He complained of his tongue feeling sore, and fearing his mouth might become suddenly affected by the calomel he had taken, I ordered him a draught of salts and senna tea; from which at 12 I found him a little depressed, I therefore directed ten grains of calomel to be taken, and the same to be repeated at 4 o'clock.—At 6 P. M. He was better, pulse good, 96; skin of moderate temperature, and feelings comfortable.—At 8. The calomel was repeated, and six grains ordered to be continued every

four hours afterwards.—5th, 6 A. M. Had a tolerable night—dozing occasionally ; had one pretty copious green oily muculent evacuation, and passed several times a little of the same in the bed, which he was sensible of, but could not prevent from the extreme soreness of the anus : passed frequently, from a quarter to half a pint of straw coloured urine at a time : no soreness of the gums, and is quite free from pain ; pulse 88, of good strength and volume, skin of natural temperature, countenance still of a dusky hue, and lips rather livid ; tongue moist and covered with a slight dark coloured mucous coat ; breathing quite easy, but rather slow ; has taken a cup of tea with much gratification.

Rept. pulv. cal. gr. vi. 4tis horis.

At 11, found him in the same state ; had him sponged all over with water strongly acidulated with the nitric acid, and had his linen and bedding changed. From the extreme acrimony of the evacuations—the scrotum and anus had become much inflamed, which however were soon relieved by the application of warm fomentations ; and as he felt a desire for wine and water—feeling occasionally faint, port wine with barley or cold water was allowed him in small quantities at his pleasure.—6 P. M. Had two scanty bilious muculent evacuations, and has passed much urine ; pulse 88, of good strength and fullness, skin of moderate temperature, tongue a little coated, but moist, gums

tender ; no pain, save a little griping occasionally, breathing natural, and feelings comfortable—

℞ Hydr. submuriat. gr. vi. opii gr. i. ft. pil. hora somni
sum. postea rept. pil. hydr. submur. sine opio 4tis
horis.

6th, 6 A. M. Passed a good night, sleeping for two or three hours at a time ; had but two scanty green muddy evacuations in the night ; countenance clearer and feels stronger ; pulse 86, moderately full and strong, skin of warm temperature, gums a little more tender, urine abundant, clear, and of straw colour.

Rept. pil. cal. gr. vi. 4tis horis.

8 P. M. Has slept a good deal during the day, and feels stronger and better ; skin cool, a little ptyalism.

℞ Hydr. submur. gr. ii. opii. gr. i. ft. pil. h.s.s.—℞ Quinæ
sulphat. gr. ii. conf. rosæ q. s. ft. pil. 2nda quaque
hora sumend.

7th, 6 A. M. During the early part of the night, he felt uncomfortable and could not sleep, but has since had three or four hours sound sleep ; had a scanty bilious evacuation in the night ; pulse 88, soft and of moderate fullness, skin cool, gums tender, and a little ptyalism. Took three of the quinine pills.

Rept. pil. quinæ 2ndis horis.

8 P. M. Took some light beef tea frequently during the day, and occasionally wine and water ; has

taken the pills regularly, and feels this evening stronger and better in every respect: had three or four muddy evacuations; a little ptyalism; pulse 86, soft and full, skin moderate temperature.

R Hydr. submur. gr iv. extr. aloë. gr. ii. ft. pil. h.s.—
R Inf. sennæ. ℥iiss. sodæ sulph. ℥ii. Mft. haust. cras
primo mane sum.

8th, 6 A. M. Slept well, has had three or four bilious evacuations, and feels in every respect better.

Rept. pil. quinae 4ter die.

8 P. M. Has taken much more nourishment to day, and feels stronger and better; three stools since morning, tongue a little sore, and gentle ptyalism.

Rept. pil. h.s. et haust. purg. cras mane.

9th, 6 A. M. Had a good night, four or five bilious evacuations, and feels better—in short he may be considered convalescent, having no complaint, but gentle salivation with a little soreness of the tongue. —12th. Has taken every night a little opening medicine, and his amendment has been rapid.

REMARKS.

Which accompanied the case when submitted to the Medical Board.

The watery purging, sense of abdominal fullness, and feelings of derangement—he experienced, throughout the day prior to his being attacked with vomiting at night, render it I think beyond doubt that he was then under the influence of the cholera cause; this I told him, and enquired if he could remember any circumstance to which it might be attributed; his reply was, none, without it was catching cold the night before, which he fancied he had done, although he felt none of the ordinary symptoms of doing so—but that on walking home from the mess-house at about half-past nine, he turned into a friend's house on the road-side, when feeling hot, he threw off his jacket, and sat in this state in the veranda exposed to the air, drinking a glass of wine and water—during which time he distinctly recollects having felt chilled, when he soon after put on his jacket and walked home. To this circumstance, I think we may fairly impute the attack, the exposure having been to an atmosphere deteriorated with malaria—of which I know there to be abundant sources in the neighbourhood. The circumstance at all events is singularly accordant with my own attack.

In the early treatment of the case, meaning at the same time from the period of its assuming the cholera character—I administered the calomel, more particularly with the view of its operation on

the hepatic function ; that after the administration of a few doses, and the amendment which had taken place in the circulation at 2 o'clock—I discontinued its use ; hoping the improvement would have been progressive, by keeping up an action upon the bowels by simple purgatives ; but being disappointed in this hope—by reflecting on the nature of the disease, which I assume to be, torpor of the general capillary circulation ; giving rise to depression of all the functions, I was led in my views, to direct my attention, to restore excitement to the torpid capillaries, and with this view I administered the calomel, and which I consider a specific stimulus* on these vessels ; and practised the blood-letting with the same intention, which I conclude it to be a powerful agent in effecting—by removing from the congested veins, resistance to the blood's free ingress from the arteries : this was the purpose I held in view in practising the blood-letting ; at the same time, bearing in mind, not to depreciate the heart's action by withdrawing too great a quantity at one time. The result I am happy to add, was most satisfactory, and I hope, and sanguinely trust, the principles adopted in the treatment of this case, will prove the foundation of a practice, which will render the treatment of this disease no longer the unsuccessful and experimental one, which it but too frequently is. The quantity of calomel it will be found administered exceeded 280 grains ; it was given in powder, that it might be diffused over the greatest extent of the stomach's surface—which is an object in a case of this kind,

* Meaning mercurials in general.

wherein, we may suppose, the absorbing action of the vessels, so much diminished by congestion, as Magendie proved by experiment, that the absorbing power of the vessels was in the inverse ratio with distention. The brandy and ammonia administered—were essential, as temporary stimulants, till mercurial excitement had time to develope itself. The only inconvenience arising from the administration of so large a quantity of mercury, has been, moderate salivation, and which is gradually subsiding, leaving the patient's stomach without any sense of derangement, as he told me yesterday, that his appetite was so good, that in despite of his sore mouth he could not forbear eating some roast fowl for dinner, and which he could hardly restrain himself from eating the whole of: he also sleeps well, and feels in short in every respect well—save, some degree of weakness, which could scarcely fail succeeding to an attack of this sort, under any treatment.

CASE B.

Ramasawmy, Lascar, ætat. 24, a spare made man, admitted into hospital on the 24th July, 1828, at half-past 6 A. M. Was attacked at about midnight, with watery purging, since which he has had ten evacuations—had one, since admission, which in appearance, is clear water, in quantity of about half a pint, with some mucous flakes dispersed through it: has cramps in his legs, arms, and fingers, which latter are much shrivelled; the cramps he says, came on soon after the purging,

and were very severe about two hours ago ; has had no vomiting, surface without moisture, but generally cold—excepting at the epigastrium, and head, which feel warm ; is quite free from pain—excepting what is occasioned by the spasms ; voice feeble, respiration free, tongue feels cold and clammy, pulse to be felt—but a mere thread. A scruple of calomel in powder was immediately washed down into the stomach, with about a table-spoonful of brandy with as much hot water ; and the extremities gently rubbed with hot flannels.—

7 A. M. Pulse a little improved, it numbers about 108 ; spasmodic quivering of the flexor muscles of the arm and fore arm excite observation, but he does not complain of pain or uneasiness in the parts—The calomel was repeated, with the brandy and water as before.—Half-past 7. Passed another evacuation, exactly like the former, and a little in the bed a short time before ; he now complains of the spasms in the hands and arms, and requires them being champooed, as well as the legs ; skin has a little increased in temperature, pulse much the same ; he lays in a state apparently of slumber, with the eyes half open and whites turned up ; breathing unoppressed, 22 times in a minute.—

Half a drachm of spt. ammon. arom. to be administered in an ounce of water every half hour.—

Quarter before 10. Has taken three doses of spt. ammon. arom. ; skin a little warmer, pulse continues very feeble, 108 : the spasms have been less frequent ; vessels of the eyes a little more injected ; had one evacuation in the bed since last report ; complains of thirst. The calomel and ammon. were now repeated : the occiput and back of the neck

were shaved, with the intention of applying a large blister—which was directed, the surface being be-smeared with ten grains of the oxinuriate of mercury, rubbed up with a little ol. terebinth.—10. Has just passed an evacuation, consisting of about an ounce of coagulated mucus, without serum: as he says, he feels better—the blister not to be applied; and as he complains of thirst, a little chicken broth may be given occasionally. The ammon. draught to be repeated if necessary.—Quarter before 11. Appears better, skin warm, pulse 112, improved both in fullness and strength; cramps less, but he still desires his legs and hands to be compressed: thirst increased, and desires cold water. A little conjee-water to be given occasionally.—2 P. M. Had one pretty copious white coagulated mucous evacuation, an hour ago, and since, another of the same description: is now quite free from cramp, dozes occasionally, and is in that state now, with his eyes half open, and whites turned up; skin of preternatural warm temperature, pulse fluctuates between 112 and 120, it is soft and of moderate fullness; much thirst.

Rx Ol. ricini, $\bar{3}$ ss. statim sumend.

A little conjee-water to be given occasionally.—5 P. M. Had two pretty copious thick curdy white mucous evacuations, is free from pain, pulse 108, rather feeble, skin cool.

Rx Hyd. subm. gr. x. stat.

8. Skin moderate temperature, pulse moderately full and firm, and feels better.

Rept. hyd. submuriat. gr. x. 6tis horis.

25th. Slept occasionally, and had four evacuations of the same coagulated mucus appearance, during the night; passed a little urine during the night—for the first time since admission; is quite free from pain, says, he feels very hungry; his eyes look sparkling, and countenance animated; skin of natural temperature, pulse 100, moderately full and firm: his gums look full, and mouth very moist, but is not in the slightest degree sore.

R Hyd. submuriat. extr. coloc. co. aa. gr. ii. ft. pil.
2nda quaque hora sumend.

Vespere.—Had several evacuations during the day, of curdled mucous appearance, but they have since become tinged of a green colour, and he has urined freely since; is quite free from pain, and has slept much during the day; feels, he says, very hungry; pulse 100, soft, skin moderate temperature.—Rept. pil.—26th. Slept well, had several copious evacuations during the night, of clear green water appearance, interspersed with mucous shreds—skin cool, pulse 90, weakly, tongue pretty clean, gums swollen, urines abundantly.

R Pulv. cinch. ꝓiii. vin. oporti ꝓviii. ꝓft. quart. part.
4ter die sum.

Vespere.—Had five evacuations of green coagulated mucus, without pain or straining; appetite good, skin of natural temperature, pulse 120, moderately full and soft, gums swollen, a little ptyalism.

R Hydr. submuriat. gr. ii. ft. pil. h. s. s.

27th. Slept well, pulse weak and 90, has a little

ptyalism, skin natural temperature, evacuations of somewhat feculent appearance.

Rept. mist. cinch. ut heri.

28th. Convalescent.

REMARKS.

The symptoms in this case, admitting of no doubt as to the real character of the disease, afforded me I consider an excellent opportunity of giving mercury a fair trial, and upon the principles detailed to the Board in the case of Captain A. was it had recourse to, viz. with the intent of restoring excitement to the capillary circulation—torpor of which, as a consequence of the inhalation of malaria, or of its effects on the cuticular capillary vessels—I assume to be, the proximate cause of the congestion, spasms, and the whole phenomena of the disease, as I have already offered an explanation of.

The success of the plan pursued in this case, is very satisfactory to me, and goes far I am of opinion, to establish the justness of the principles held in view, and to exhibit the remedy, in the character if there be any such in the cure of a disease—of a specific: for it was in this case assuredly, the only—remedy; for experience has but too often proved, the other stimulants administered—which were here, with a view of supporting a certain degree of excitement, till the remedy could be absorbed from the stomach, and had time to operate—are quite

unequal to the cure of the disease: though doubtless, useful agents with the intentions specified.

The sedative effect of mercury is much talked of, but if it have any claim to such a property, I should say—it only becomes manifest with the sense of debility, following its evacuating effects: that after it operates in this way, either upon the salivary or biliary secretions, instead of having recourse to purgatives, and thus increasing debility, bark and port wine I think become essential, to the establishment of that degree of permanent excitement upon which the functions in health so materially depend, and with which view it was administered in this case.

3.

John Tennant, gunner, ætat. 24, a stout healthy recruit, only 5 days in India, 25th of September, 1828, was brought into hospital at half-past 9 at night, with vomiting, purging, and severe cramps: states that he was attacked with slight purging about two o'clock in the afternoon, after taking some ginger-beer; but had no vomiting or cramp until 9 o'clock. Immediately on his admission had a clear watery stool, in quantity of about half a pint. Has severe spasms, both of the upper and lower extremities; complains of severe pain in the epigastrium, countenance collapsed and anxious, pulse 126, weak and fluttering, skin cold, thirst urgent, tongue dry.

R Spt. ammon. arom. ʒss. tinct. opii. gtt. 40. mist.
camphor. ʒii. statim.

Frictions with hot flannels and spirit of turpentine to the extremities; vomited the draught imme-

diately after it was taken, and along with it a quantity of clear fluid.—A scruple of colomel was then given, and washed down with half a drachm of spt. ammon. arom. and two ounces mist. camph.—and brandy with warm water given occasionally afterwards.—Half-past 10 P. M. Has had no vomiting or stool since 10 o'clock, but the cramps in his extremities continue very severe; pulse 126, extremely weak, skin cold, and covered with a clammy sweat, much oppression of breathing, great thirst, fingers shrivelled.

Venæsectio e brach. R Spt. ammon. arom. ʒss. mist. camph. ʒii. to be taken every half hour.

11 o'clock. Only eight ounces of dark ropy blood were with difficulty extracted; has passed one copious watery stool intermixed with a quantity of mucous shreds; cramps continue very severe.

Rept. hyd. submur. ʒi. et cont. alia.

Midnight. No stool since 11 o'clock, cramps relieved, skin cold and clammy, pulse 108, feeble, but distinct; much anxiety and restlessness, thirst urgent, has passed no urine since his admission into hospital, complains of heat.—2 A. M. Lies apparently asleep, with his eyes half open; no stool, but vomited a quantity of watery fluid; has slight cramps in his toes and fingers, pulse rather better volume, skin cold.

Rept. calomel. ʒi. cont. brandy with warm water.

4 A. M. Pulse 112 and increased in volume, skin warmer, countenance somewhat more animated; one stool of thin conjee appearance; had slight cramps about three o'clock, which were relieved by

friction; no vomiting since last report, thirst considerable.

R̄ Ol. ricini. aq. menth. pp. aa. ʒj. statim. to have a little thin arrow root and brandy occasionally.

Half-past 6. Has had one stool of a conjee appearance, and has passed a small quantity of urine; pulse 100, of moderate fullness, skin becoming warm, thirst not so urgent.

Cont. ut antea.

10 A. M. Has had three stools—the two first of conjee appearance, the latter feculent; skin warm, pulse 104 and of good volume, still complains of thirst.

R̄ Calomel. gr. iii. pulv. ant. gr. ii. 4ta quaq. hora sumend.

1 P. M. Had no stool until 12 o'clock, since which time has had three of a dark green colour, but containing some fæces, and a quantity of mucous shreds; passes his urine freely; skin cool, pulse 108; has taken a little sago with an ounce of brandy a few minutes ago.—Cont. pilulæ.—6 P. M. Has had two stools since one o'clock of the same appearance, but containing more fæces; skin natural heat, pulse 104.—Cont. pilulæ, &c.—27th. Has slept tolerably during the night; two stools of a highly bilious nature; pulse 98, skin natural heat.

R̄ Ol. ricini. ʒi. statim. arrow root for breakfast.

Vespr. Has had four highly bilious and feculent evacuations, skin cool, pulse 88, no particular thirst.

R̄ Calomel. gr. v. h.s.s.

28th. Has passed a good night, and had two scanty bilious stools; skin cool, pulse 86, tongue clean, serotum inflamed and excoriated, passes his urine freely.

R. Ol. ricini. ℥i. statim. lotio plumbi p.d. app.

29th. No complaint but weakness; mouth slightly sore.—Convalescent.

Another patient was admitted into hospital a few hours after this man, with precisely the same symptoms, and was treated in the same way, with the like success.

On the subject of Fever, touched upon in the 92nd page, as I have failed in explaining my views as clearly as I could have desired, I would beg, although out of place, to be permitted to correct myself here, or rather, to be allowed to enter a little more fully into the subject.

Fever—I would define, to be a state of system under arterial excitement—hence the more prominent and characteristic indications of its presence, are, preternaturally increased temperature of the body, and velocity of the pulse; the immediate cause of which may be, either the direct operation of a stimulus on the action of the heart and vessels of circulation, or their excitement may be indirectly and secondarily induced—hence the class pyrexia, is divisible into two orders—the synochal

and the typhoidal. To the latter I shall first direct attention.—The essential cause of which (as the inhalation of malaria, the matter of contagion, &c.) I assume to be, of sedative operation—acting primarily by the blood's contamination, on the capillary circulation at large. The sedative operation of the primary cause being then, I repeat, on the capillary circulation, there is an equivalent defective evolution of caloric and electricity, as I maintain, that these, or in other words vital temperature and nervous energy—are evolved from the blood in circulation, during its change from the arterial to the venous state; and hence their general diffusion, and an explanation, of the increased sensibility and temperature, of a part in augmented capillary action or inflammation: the reverse of which here obtains, from diminished evolution, which involving, the structure and function of the heart, as well as of the lungs, and every other organ throughout the body—hence the sense of coldness, depressed pulse, and in short depreciation of all the functions, and premonitory symptoms of fever that ensue; this stage of oppression giving rise to venous congestion, which opposing resistance to the free egress of blood from the arterial capillaries—they become (in all cases of fever wherein the sedative agent is not so intensely virulent as to render them insusceptible of reaction) excited by distention, to increased action; and hence the same symptoms follow, as would ensue by the direct application of a stimulus, as in the synochal order: the most frequent causes of which, are the excitement of spirituous liquors, or the suppression of some customary secretion or discharge, as that of the skin, the drying up of

ulcers, or the operation of cold in the manner I have already explained. Excitement then, or increased action from these causes, being thus brought about in the arterial capillaries, and which being general throughout the system, (in distinction to what takes place in inflammation,) and consequently involving the structure of the heart and arteries, as well as of the brain, the lungs, and every other organ and function—hence the exalted action, velocity of pulse, heat of skin, and the whole phenomena of fever that ensue.

Thus viewing fever, what are the indications of treatment? In both cases, it is obvious—the primary to be pursued, is, the subduction of excitement; but assuredly our practice should be modified, or bear some reference to the cause and way in which the symptoms are brought about; hence bleeding, diluents, purgatives, and so forth are the means to be resorted to in the synochial order—which is generally to be distinguished by the fever being of a continued type; whereas the typhoidal, throughout the order, have certain intermissions, remissions, or exacerbations, the excitement not being dependent on a permanent course of stimulation. On the contrary, being but secondarily induced, by the distention of the arterial capillaries as a consequence of defective excitement in the first instance, and hence debilitating measures must be more cautiously pursued: the indications of treatment, being, not only the subduction of excitement during the paroxysm or febrile state, but the purification of the blood by the excitement of the secretions, and hence the utility of mercury; and further, the establishment of that degree of tone or perma-

nent excitement, (on which the functions in health are so materially dependent) as a preventive of that degree of congestion, which gives rise to the paroxysm or febrile condition: and which I believe to be the operation of the bark, or quinine in effecting.

It is however obvious, that, the mereury should not in these cases be carried to an extent productive of debility, by the evaeuations induced: though probably it is in this way to a certain extent, more, however, I am of opinion, by the derivation induced, when inflammation has become developed, that the production of ptyalism, is so successfully practised; as exemplified in hepatitis, dysentery, &c: and to the want of attention to this particular, it is, perhaps, that there is such a diversity of opinion respecting the propriety of its administration in fever: in the acute stage of the synoehal order it is assuredly contra-indicated, but in the atonic stage, to support excitement in the exhausted and debilitated capillaries, a state analogous to that in which these vessels are in the typhoidal order, judiciously employed, mereury is, perhaps, of all remedies, the most successful.

PART II.

AN ESSAY *

ON

VITAL TEMPERATURE AND NERVOUS ENERGY;

Or, in other words, on the *Caloric* and *Electricity* of the animal system; for the nervous energy is now considered to be electricity, by many of the best physiologists of the day; from its known property of exciting muscular contraction, and illustrating many of the phenomena of life: in short, have not the late experiments of Dr. Wilson Philip carrying on the process of secretion through the agency of galvanism, which if not identical with electricity, is in principle the same—established this point, when conjoined in consideration with the fact—that certain animals generate it so abundantly, that they possess it as a weapon of defence? Its production in the system, has not however been at all satisfactorily explained; indeed, the only explanation I believe to have been offered, is that,

* This essay was submitted to the Medical and Physical Society of Madras, under date of the 11th December, 1826.—The Society however, not being duly supported, was soon after dissolved, when this paper was returned to me.

of considering it a secretion of the brain ; an opinion completely disproved, by the symptoms of vitality having been carried on in the bodies of decapitated animals ; and all the functions of life going on in acephalous monsters. Another attempt at explanation, I hope will therefore be received with indulgence, although offered, with some degree of confidence, as it satisfactorily explains, to my conception, many of the phenomena of vital action, both in health and disease, clouded at present in complete obscurity.

To the elucidation of the subject, I must introduce a few preparatory considerations, on respiration and assimilation : and using the words of Mr. Murray, quoted in Rees's Cyclopædia. "The blood is the source whence the animal products are formed, its expenditure is supplied by the chyle, a fluid less completely animalized than the blood itself; the peculiar character of animal matter, with regard to composition, is, a large proportion of nitrogen,* and a diminished proportion of car-

* From whence is the nitrogen obtained, which enters so largely into the composition of muscular, and other animal substances—seeing that it forms so small a constituent of vegetable matter, the only food of most animals ; is it not probable that it is absorbed from the atmosphere in some way ? if not in respiration, that it may be received into the system in combination with the food during mastication and deglutition ; and may not this be the primary intention of the re-mastication of the food in ruminating animals ? this would at all events assign some purpose to four-fifths of the atmosphere, which it is no doubt from ignorance alone, are now regarded of no consideration, a mere diluent to the remaining one-fifth of oxygen, (to which we attach so much importance), which ill accords with the harmonious œconomy of nature ! This opinion meets with support from the fact, that fish and leeches increase in size when kept in glass vessels of pure water ; now as nitrogen is an abundant constituent of their structure, it is to this source, as it exists in its free state, or in combination with the water, their growth must be principally attributed.

bon; it may therefore be inferred, that in the extreme vessels, where the animal solids and fluids are formed, the general process will be, the separation from the blood of those elements of which animal matter is composed, and that of course carbon, which enters more sparingly into its composition, will exist in the remaining blood in an increased proportion,—this is accordingly the general nature of the conversion of arterial into venous blood; nitrogen, hydrogen, and other elements are spent in the formation of new products, and the proximate principles of the blood, probably the crassamentum chiefly, remain, with an increased proportion of carbon; in this state it is exposed, to the atmospheric air in the lungs, the oxygen of which, abstracts its excess of carbon, and forms the carbonic acid expired, and this constitutes the conversion of venous into arterial blood. The conversion of arterial into venous blood, is then considered, in connexion with the chemical changes going on in the system, and is subservient to them: in the extreme vessels, the constituent principles of the blood are expended, in the formation and nourishment of the solid fibre, in the formation of the secreted fluids, and in support perhaps of the living powers; of these principles, carbon, is that contained in the smallest proportion in the solids and fluids, it is therefore that of which there is the least expenditure, and consequently it must be present in a larger proportion in the blood after it has undergone these changes; and hence the necessity of the application of oxygen to the blood in the lungs, to abstract, and prevent its undue accumulation.”

From the same source, Recs's Cyclopædia, as

bearing upon my argument, I beg to make the following quotation.—“ ‘These results (in allusion to a former paragraph, proving the higher specific temperature of arterial, to venous blood, which was computed as 114 to 100), derive confirmation, from the experiments of Mr. Coleman, who, in order to discover the relative specific heat of arterial to venal blood, while yet retained in the system, strangled a cat, and immediately opened its chest, while the blood in the left ventricle was still fluid; he then introduced a thermometer, through an opening in the pericardium, on each side of the heart, and it stood at 98 degrees; in the left ventricle the blood was only 97; and in the right ventricle, it was nearly 99 degrees; in 15 minutes, however, instead of the right ventricle possessing two degrees of heat more than the left, it was found to have four degrees less. Mr. Astley Cooper repeated this experiment in various ways, and found invariably, that although the venal blood was superior in temperature at first, yet before coagulation was complete, the arterial became from three to six degrees warmer. These facts afford, clear and decisive proof, that the specific heat of arterial blood, exceeds that of the venal; and demonstrates likewise, that this excess is obtained during the passage of the blood through the lungs.”

Bearing in mind these quotations, I shall now proceed in my object, to shew the source of the electric fluid, and the body's temperature. It is an established fact in chemistry, that the decomposition of a compound, or the formation of a new one—is attended, with a variation in the electrical capacities of the products; the change manifesting

an increase or diminution in this respect, it becoming either plus or minus, latent or evolved. Now as the process of accretion, assimilation, and secretion, which constitute the change, or conversion of the arterial into venous blood, as so elegantly explained by Mr. Murray, is a chemical process—I would say, this conversion, at the extremity of the capillary arteries, is attended, not only with an evolution of caloric, but of electricity also; hence from the caloric, the increased temperature of the venous blood, previously noticed; and thus, the equal diffusion of the body's temperature; and vitality also—as the evolution of caloric is attended at the same time with that of electricity, at the termination of every arterial ramification throughout the system: the former of which, or its caloric, being abstracted, by the surrounding media, from the superficies of the body; or in combination with the perspirable and bronchial secretions—is exhaled in the form of vapour, from the skin and lungs: the latter or electrical evolution, which I believe to be in a ratio with the calorific, and chemical change that has taken place, having its source in the capillary circulation, explains the reason why, contractility and vitality go on in these vessels, for a considerable time after the apparent death of an animal; and the irritability of muscular fibre, after the symptoms more particularly denoting life have ceased; and it explains also the reason why, the arteries after death are found empty,—the electrical evolution it may be inferred being still going on in the capillary system, as long as the arterial trunks furnish blood for their excitement.

Another argument that may be adduced, favour-

ing this view of its generation, is the known fact that a capillary tube is quite impervious to the passage of a fluid—but under the excitement of electricity, admits its passage freely; now as the capillary vessels of the animal system are so minute, that they are not discernible by the naked eye, but with a powerful glass, the free circulation of the blood is to be seen through them, we are warranted in our analogy in supposing they may be excited by the same means; as it has been proved, that, it is no impulse from the heart, nor action of the arteries, that carries on the circulation in these vessels, as it still goes on, long after the heart has been removed from the body: and further, that the excitement of these vessels is not derived from the brain and nerves, has been proved, by removing both brain and spinal marrow; and the same may be inferred, from what we notice in palsy; that there can be little doubt I think, of its origin being in the way I have suggested.

The electricity thus generated, I am further of opinion, is transmitted by the most perfect conductors—the nerves, to their source, in the common acceptation of the word, and its receptacle—the brain and spinal marrow; from whence, it is again transmitted by the nerves, at the pleasure of volition in the several actions of muscular contraction; excites the sensorium to the various operations of the mind; and the organs of sense to their respective functions; or, is transmitted by the par vagum, to the great secretive processes of the stomach,*

* May not the operation of electricity, in effecting secretion, be the re-combination of this fluid, with the constituents of the secretion? for electricity, certainly has a free and a latent state, as much as caloric;

and other organs to which these nerves are distributed:—and hence the intimate connection, and remarkable sympathy, existing between the head and stomach, or the liver; and an explanation why, mental emotions so immediately derange digestion, —by withdrawing from the stomach, that stream of excitement which is necessary to the seerative and digestive processes: and the same explanation obtains, why, much exercise after a meal produces the like effect.

It will be noticed, that I attach to the nerves, the two-fold office, of conductors of electricity from its source in the capillary system, and of affording it passage to the muscles of volition: that they fulfil both these offices, has I think lately been proved; first I may mention, that Mr. Charles Bell has demonstrated, that each nerve consists of a bundle of fibres enclosed in the same common sheath, some proceeding from, and others to the

and is not the operation of the latter or gastric juice in digestion, the chemical affinity it has for the alimentary material?—for chemical affinity is the only reasonable explanation that presents itself to the mind, why, a fluid so bland, and apparently inert, as the gastric secretion, should operate such powerful effects, in the solution or digestion of substances, which out of the body we possess no means at all analogous in accomplishing! may not the compound of these two all-powerful agents, caloric and electricity, constitute oxygen gas?—it may be urged in objection, that the latter has gravity, the former two have not; they are both though, perhaps, as ponderable in relation to oxygen gas, as hydrogen and oxygen are to their compound—water. I merely throw out the hint, thinking it not unworthy of notice, as it meets with some degree of support, in considering the means usually employed in obtaining both the electric and galvanic fluids; and I may add, that this view of the nature of oxygen, taken in connection with the compound, which I have suggested, as constituting the gastric secretion, throws some light upon the very active solvent and other chemical powers, possessed by both the acids and alkalis, into the composition of which, oxygen enters so largely!

spine; this is confirmed by Magendie's experiments, (which, however, I believe Mr. Bell had previously accomplished, or was the first to conceive), which particularly favour my argument: it will be remembered, that each of the spinal nerves, originate by two roots, one from the posterior, and the other from the anterior part of the marrow. Magendie, having divided the posterior roots, "found, that the limb corresponding to the divided nerves, was insensible to punctures, and the strongest pressure; but, to his surprise, the animal could move the limb perfectly, although its sensibility was quite extinct. He then divided the anterior roots, of other of the nerves, leaving the posterior entire, when the limb immediately became lax and immovable, whilst it unequivocally preserved its sensibility: finally, he cut at once both roots, when there was an absolute loss of both sensibility and motion." That he concludes his experiments, by observing, "that he is enabled positively to assert, that the anterior and posterior roots of the nerves, which spring from the spinal marrow, have different functions; that the posterior appear more particularly destined for sensibility, whilst the anterior seem more especially connected with motion." These views of Magendie receive confirmation from a case of palsy, recorded in a late number of the *London Medical and Physical Journal*; the patient having lost the sensibility of one limb, but retaining the power of motion; and in the other limb, the reverse of this, losing the motive power, but possessing sensibility.

From which data, the following inferences meet with support; that each nerve consists of two

branches, or sets of fibres, one connected with the posterior roots in the spine, which I should denominate—the converging fibres, or conveyancers of the electric fluid, and impressions from their source—to the spine and brain; the other, the anterior or diverging branch, being charged from the spine and brain to carry volition into operation, in the excitement of muscular contraction. If such be the case, it will be asked, how the action of the involuntary muscles is effected—such it will be remembered, receive their nervous excitement from the sympathetic—this nerve, contrary to all other nerves of the body, has no particular origin, but is composed, I should say, of the filaments given off from every nerve of volition, whether proceeding from the spine, or the brain, and with which it holds communication through the intervention of a ganglion—the office of which may be either that of rendering the sympathetic a more perfect conductor of electricity, than the rest of the nerves of the body; or, as a valve—admitting its ingress, but not of its egress, from the vital organs—hence, the organs to which the sympathetic is distributed, being in function primary, in the scale of animal existence, to the brain and spinal marrow, will be the first to receive electrical excitement, and the last to lose it, as long as the fluid is generated, and transmitted from all, and any part of the capillary system; and thus it is, that after the apparent death of an animal, the senses having fled, and powers of volition ceased, the peristaltic motion of the stomach and intestines still continue for a long time; and the capillary circulation, to some extent, even after this has failed.

Lastly, I may observe, that my opinion of the two-fold office of the spinal nerves, and in short all of volition, (all such having ganglions) receives support, from the circumstance, of the ganglions connecting the sympathetic, being attached to the posterior roots,—and this fact again supports the view of these nerves being the source from which the sympathetic receives its electrical supply,—the posterior being the collecting fibres. In further support of these views, I shall make a few extracts from Dr. Wilson Philip's Enquiry into the Laws of the Vital Functions, and offer some remarks upon the deductions he arrived at, from his very numerous and well conducted experiments.

1st. He proved, that the vessels of circulation, (the capillary) possess a power capable of supporting a certain motion of the blood, independent of the heart, by the following experiments. “A ligature was thrown round the vessels attached to the heart of a frog, and the heart was then cut out; on bringing the web of one of the legs before the microscope, the circulation was found in it to be vigorous, and continued so for many minutes; at length, gradually becoming more languid.” The like experiment was tried upon a rabbit, “and the blood was found to be moving freely in the capillary vessels of the mesentery, an hour and a quarter after the heart had been removed.”

2nd. He proved, that the power both of the heart and vessels of circulation is independent of the brain and spinal marrow, by numerous experiments; the following may be adduced as in every respect satisfactory. “The brain and spinal marrow of a frog were removed at the same time;

on opening the thorax, the heart was found performing the circulation freely. The spinal marrow of a rabbit was laid bare, from the occiput to the beginning of the dorsal vertebræ, the circulation being supported by artificial respiration; the chest was then opened, and the heart found beating regularly and with considerable force; the spinal marrow, as far as it was made bare, was now removed, without in the least affecting the heart's action; after this, the artificial respiration being frequently discontinued, the action of the heart was repeatedly seen to become languid, and increase on renewing it; the skull was then opened, and the whole of the brain removed, but without any abatement of the action of the heart, which still continued to be more or less powerful, according as we discontinued or renewed artificial respiration,—this being for a considerable time discontinued, the ventricles ceased to beat, about half an hour after the removal of the brain; but on renewing respiration, the action of the ventricles was restored; the respiration was again discontinued and renewed with the same effects.”—In another experiment; “A strong ligature was thrown round the neck of a frog, and the head cut off, without any loss of blood, (much loss of blood immediately destroys the circulation in the extremities,) the spinal marrow was then destroyed, on bringing the web of one of the hind legs before the microscope, we found the circulation in it vigorous for many minutes, and in all respects resembling that in the web of a healthy frog.”

Dr. Philip in concluding these experiments, observes, “Does it not seem a necessary inference,

that the action of the heart, and vessels of circulation, depend on a power inherent in themselves, and having no direct dependence on the nervous system?" it assuredly does, and does not my explanation of these phenomena, afford a satisfactory solution of these points?—that, the action of vitality commences in the capillary arteries, under the excitement of the blood, and that the heart's irritability is dependent on the same cause—viz. its structural capillary circulation; and its excitement as a muscular organ, derived from the sympathetic—as a collector of electricity from all quarters; aided though, no doubt, by the stimulus of the blood on its internal surface, and the irritation of distention—it is however a question in my mind, if this is not rather attributable to the influence and excitement that it imparts to its structural circulation. I think it also a probable circumstance, that the heart's action may be excited to a certain extent, by the electricity of its own generation; and the same probably obtains with the other organs of involuntary muscular action,—as these organs have no conducting nerves, or such that we have pointed out, which abstract this influence from other parts of the system.

3rd. Dr. Philip subsequently proves, that "the action both of the heart and capillaries, is to be influenced through the medium both of the brain and spinal marrow;" for instance, that alcohol applied either to the brain or spinal marrow, accelerates their action, and that tobacco debilitates them; I shall not adduce any experiment in proof of these points, as there can be no difficulty in conceiving this to be the case, when we reflect on the

formation of the sympathetic nerve, from twigs holding communication with these organs, as well as the connexion maintained between them, through the medium of the 8th pair; and the same may be said of the peristaltic motion of the stomach and intestines; which he proves also to be “independent in their action of the brain and spinal marrow, but like the heart to be influenced through the medium of these organs.”

The following experiments of Dr. Philip favors the opinion that electricity is the cause of nervous excitement, and that the brain is its receptacle. By dividing both of the eighth pair of nerves, or par vagum, which descend from the brain, and thus cutting off the supply of electricity, the secretive and digestive processes of the stomach—the organ to which they are so largely distributed—are arrested; but these processes he completely restored, by furnishing the organ with a supply of the galvanic fluid along the divided nerves: further he proved by experiment, that “the secreting power of the stomach, is almost as much deranged, by destroying a considerable part of the spinal marrow, as by dividing the eighth pair of nerves.” This is a strong argument in favor of my views; it does so, by depriving the organ of that portion of electricity, which would be otherwise transmitted from the brain, and obtained, through the medium of the spinal marrow, from the collecting nerves—in short, depriving the brain of its principal source of supply. The function of the involuntary muscles it will be remembered, as proved by a former experiment, in this case is not affected, as they derive

their excitement from the sympathetic, which still holds its communication with the collecting nerves ; which tends to corroborate my opinion as to the origin and office of the sympathetic.

Dr. Philip goes on to observe, as legitimate deductions from his numerous experiments—" That the ganglions are a secondary centre of nervous influence, whose nerves are as extensively distributed, as those which proceed from the brain and spinal marrow ; that the ganglions are the means by which the influence of these organs is bestowed on the parts, which we have found influenced by every part of these organs ;" viz. the organs independent of volition. He goes on to say, " that we have reason to believe, that the great sympathetic arises from the spinal marrow, as it is largest about the middle of the spine, becoming less as it descends."

Doctor Philip further observes—" That the excitement of the organs of involuntary motion in all their usual functions, appears to be rendered independent of the nervous influence," (of course he here alludes to the brain and spinal marrow,) " because their functions require a more uniform excitement, than could have been derived from this source." Let me remark how well does my explanation provide these organs, with an equal and constant supply ; and how much more probable is the use I assign the ganglions, their structure, size, and distribution, I should think by no means qualifying them, for the generation of this principle, but the power of abstracting it from the collecting nerves, by rendering the sympathetic a more perfect con-

ductor, or admitting of its ingress to these organs, but not of its departure, is no improbable conclusion.

Dr. Philip adds, "We have reason to believe, that the nervous influence is the galvanic fluid, collected by the brain and spinal marrow, and sent along the nerves ; it being not only of all artificial means of exciting the muscles, that which seems best adapted to the purpose, but capable of both forming the secreted fluids, and causing an evolution of caloric from the blood, after the nervous influence is withdrawn.

"The nervous power is not more distinct from the muscular (alluding, doubtless, to the irritability of muscular fibre,) than it is from the sensorial power, as we find the first capable of its functions, after the last is withdrawn.

"The only function essential to animal life in which the sensorial power is concerned is respiration, and consequently, it is by the interruption of this function, (that is the excitement imparted by nerves coming from the brain to the muscles of respiration) that the removal of the sensorial power proves fatal ; except where the sensorium is so impressed, as immediately to destroy all the functions ;" which was the case when Dr. Philip suddenly smashed the whole of the brain of a rabbit, and which probably annihilating the whole charge of the system, is analogous in effect to a stroke of lightning ; the latter operating I presume, in the following way, this larger charge of electricity being positive, to the body's small quantity and relative negative state, completely annihilates it, to the extinction of all the functions—hence it is that

from the cessation of the capillary circulation, the muscles in such cases are found to have immediately lost their irritability, and that blood is, I believe, discovered in the arterial, as well as the venous system. “The sensorial power appears to be the last which is produced, and the first whose operation ceases.” This becomes a necessary deduction from my argument, of its source being in the organic capillary structure. I shall conclude the subject by offering a few remarks on the functions of the brain; as a whole, I am of opinion, it may be considered as the receptaculum commune of the electric or nervous fluid, and which it receives through the medium principally of the spinal marrow, from the numerous collecting nerves of the body: it may be objected, having the power to retain so unconfined an agent as electricity; this objection, however, cannot apply farther, than in relation to the other parts of the system; now the conducting and comparatively retaining power of substances out of the body are manifold, and as the nerves I believe have been found to be the best conductors amongst the textures constituting the animal fabric, and as the medullary fibre of the brain is of the same nervous character, there can be no difficulty in conceiving the thing. Consider, also, the membranes in which it is enveloped, and that the dura mater forms a sheath to the spinal canal, and to every nerve proceeding therefrom, may it not insulate these fibres from adjacent connections; and does not this opinion receive support from the fact, that no nerves have yet been traced to enter into the composition of its texture, so different from all others? And may not this be one

of the purposes of the hair covering the head, as if it were, if I may be allowed the expression, to insulate the brain from without? There is no doubt but that the air and surrounding media gradually abstract it from us, and that it escapes from the system in conjunction with the perspirable and other secretions; hence when any of the more important secretions are suppressed, there is so much irritation and restlessness experienced. Let it be also observed, that it is only for a temporary purpose I suppose it possesses this power of retention, not supposing there is, at any time, a large accumulation; for the demands on the fund are so manifold, particularly in the excitement of the respiratory muscles, and the secretive and digestive processes, which are constantly going on, that the expenditure I conceive at most times equals the supply. Its being otherwise, probably may be the cause in some cases of madness, the mental organ being over excited; hence it is, that examination of the brain, in such cases after death, so frequently present no lesion of structure. Or where the stomach is kept in a state of constant excitement by a full diet and tit bits, that the mental organ is not duly excited, making good the passage in Shakespeare, that

“ Fat paunches have lean pates,
While dainty bits make rich the ribs,
They banter out the wits.”

And that idiotism may be dependent on some defect in the communication of excitement to this organ: and cretinism to the same, though secondarily induced as a consequence of a defective sup-

ply, resulting from the respiration of malaria, or a very rare and attenuated atmosphere.

The brain also, in a restricted sense of the word, I concur in opinion with Gall and Spurzheim, as being the organ of the mind, but I am not prepared to say anything of their division of it into parts, as numerous as there are faculties; but speaking of the brain again in the aggregate, that is, of the whole substance within the cranium, I would assign, to different portions, different purposes,—that the cerebrum surmounting the medulla oblongata, consists of numerous convolutions, united to the central fibrous medullary structure, in a manner analogous to the intestines on the periphery of the mesentery, and is the organ speaking of it as a whole, the functions of which are intellectual;—this anatomical description of it, which accords with *Monro's*, I have lately had an opportunity of satisfying myself of by dissection, the subject having died suddenly with a highly injected state of the pia mater, by which the hemispheres admitted of being completely unfolded in this way.

The medulla oblongata* (from which all the nerves of sense I believe arise) is the organ appropriated to receive the impressions of the senses, and which it communicates to the mind, by the blending of its nervous fibres with those of the cerebral organ, in the medullary portion of the latter. It is very clear that the senses are united in function, as they are only thus conjointly under the power of volition, as a proof, I cannot will to see, without both hearing and smelling, nor have

* In the fullest extent of the appellation.

I the power to arrest the function of either singly, but the whole I can simultaneously, by going to sleep; and thus it is that the muscular nerves of the organs of sense arise also from the medulla, as they are united in effect; and hence also it is, that the medulla oblongata is formed, by the union of the crura cerebri et cerebelli, or at least, that they enter very largely into its composition, thus blending the animal functions or voluntary, with the mental in this organ, as they are conjointly in operation.

The state of being awake, or alive to all the impressions of sense, I am of opinion is that, in which the current of electricity passes through or is extended to the medulla oblongata, and thus are the senses and all the functions in a state of excitement; whereas, in sleep, the stream of electricity takes a different channel, or perhaps wholly passes off by the 8th pair, which, it will be remembered, arise from the inferior part of the medulla; hence it is that digestion and the secretive processes are much more active during the state of sleep, and that dreams, we may infer, are occasioned by the excitement of the intellectual organ, by the 8th pair not withdrawing a quantity of electricity equal to the supply; meaning, of course, the quantity over and above what is required for the excitement of the respiratory muscles, which are at all times in operation; and, as their action is voluntary,* it is very clear the organ of volition can

* Mr. Charles Bell has, however, proved this to be incorrect, the respiratory muscles being supplied with nerves, which arise from the same part of the medulla oblongata as the par vagum, and with which they

never be at rest, like that of the mind and senses ; and hence it is that we often turn over and move unconsciously during sleep ; and this consideration affords some insight into the state of somnambulism. Finally, the spinal marrow appended to and surmounted by the cerebellum, are organs appropriated to volition, and the numerous functions more particularly characterising animal existence.

In conclusion, it may be observed, that the scale of animal life comprises three conditions of existence. First—the organic, or that going on in the capillary system, or structure analogous ; this, bordering on vegetable life ; and the latter, on chemical affinity ; rendering the last, the bond of union between organic and inanimate nature.

Second—the nervous and sentient, dependent on the first—or the more particularly animal, connected with organs of sense and volition.

are associated in action, and the whole independent of volition ; a fact, however, which is not less in support of my views of the state of sleep and functions of these nerves. Indeed, I would almost venture the opinion, that there is a regular circulation of the electric or nervous fluid : proceeding from its source in the capillary circulation, and along the collecting fibres of the nerves—it communicates, in its passage to the spine, what is required to the twigs given off, forming the roots of the sympathetic, for the excitement of the involuntary organs ; the rest proceeding along the spine, communicates, through the medium of the medulla oblongata, excitement to the sensorium, in all its functions, during the period of being awake ; and finally, passes off by the respiratory nerves and 8th pair ; it being expended in the first instance, and in the second, re-combining with the gastric and other secretions, is again in combination with the alimentary material, received into the circulation ; from which it becomes re-evolved, in the blood's change from the arterial to the venous state. In the state of sleep it does not extend its influence to the medulla, but arriving at the summit of the spine, it passes off at once by the 8th pair and respiratory nerves, which, arising below the pons varolii, is rather from the spinal marrow than the medulla.

The third and last surmounting the whole, the intellectual ; on the summit of which, man stands proudly pre-eminent, with a brain or cerebral organ, developed in a ratio with his vast comprehension, and superiority of mind, above the rest of the Almighty's creation ; and holding communion with an immortal spirit, in a way inconceivable to the limited number of faculties, with which, it has been the pleasure of the Almighty to endow him.

FINIS.

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